The CHEMICAL AGE

VOL LX 5 MARCH 1949 No 1547

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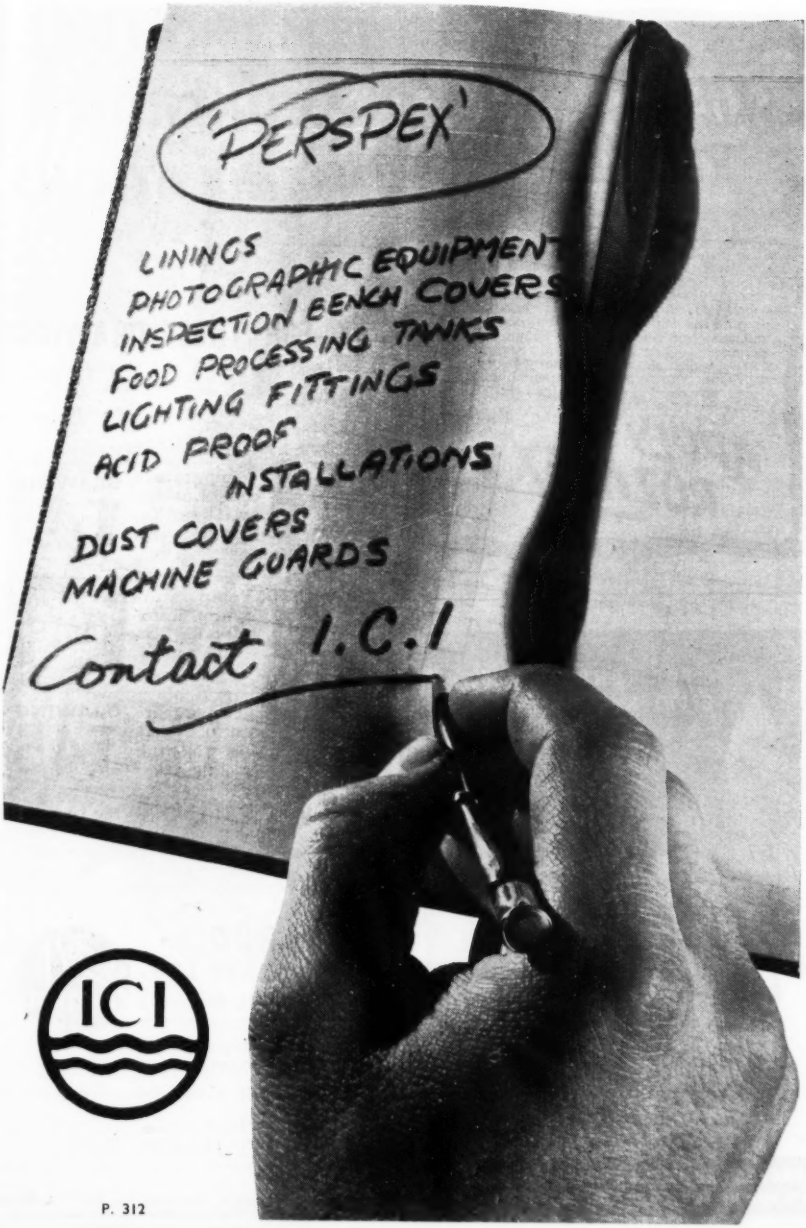
INDEX TO ADVERTISERS
IN THIS ISSUE


'PERSPEX'
LININGS
PHOTOGRAPHIC EQUIPMENT
INSPECTION BENCH COVERS
FOOD PROCESSING TANKS
LIGHTING FITTINGS
ACID PROOF INSTALLATIONS
DUST COVERS
MACHINE GUARDS
Contact I.C.I
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The Chemical Age

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BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON
Telephone: CENTRAL 3212 (20 lines)

SCOTTISH OFFICE
116 Hope Street, Glasgow (Central 3970)

MIDLANDS OFFICE
Daimler House, Paradise Street, Birmingham (Midland 0784-5)

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Neglected Minerals

FEW substances in common use in chemical industries have exemplified more strikingly than has lead the progressive rise in values of basic materials since war first upset all market standards. Virgin pig lead in January reached the unprecedented price of £123 per ton. Twelve months ago it cost £90; in 1946 its price was £39. That surprising new figure is, of course, only one of several quoted for lead, according to the purpose for which it is required. The chemical plant manufacturer may be paying for lead sheet a figure in the neighbourhood of £141 per ton, while the scrap metal buyer may give £30 less. The drastic revaluation, like most others of the same kind, is associated most directly with greatly increased use of lead by undersupplied industries around the world, the effect of which has been heightened by dwindling output. Paradoxically, there is no marked shortage of lead supplies in this country, but it is reasonable to expect that much fuller use would be made of the metal could the price level be substantially lowered. That, however, seems to be a remote prospect, which cannot be brought into closer perspective without a development of the surveying and mining programme of the kind which the current proposals for using American Aid have in view, although it will require to be on a substantially larger scale than the strange new ECA project appears to contemplate.

When he was Deputy Director of Geological Survey, Nigeria, Dr. R. A. M. Mackay, A.I.M.M. (now of the Geological Survey in this country), stressed the point that new discoveries of lead had showed no promise of offsetting the increasing demand; indeed, he added, the gap between world production and consumption was such that in about 15 years the known reserves might become exhausted if the relative figures remained substantially in the same ratio. Since then, the gap has tended to become greater. Dr. Mackay's prophecy represents the extreme view, yet it differs only slightly from a conjectural figure of 18 years given by Dr. K. C. Dunham in August last at the International Geological Congress. Since 1935, world production figures of lead rose satisfactorily from 1.37 million tons (in 1935) to 1.75 million (in 1940). That was the peak, and the yearly total has fallen consistently to the record low level of 1.16 million tons in 1946. Since then there has been a small measure of recovery, represented by the 1.25 million tons in 1947. The steady decline since 1944 may well be attributed to the shortage of easily won lead. The 1948 production will probably equal that of 1947.

In contrast, it is revealing—and somewhat alarming—to consider the world's average consumption in decades the last 80 years: 1860, 200,000 tons; 1870, 300,000; 1880, 400,000; 1890, 600,000; 1900, 900,000; 1910, 1,100,000; 1920, 900,000; 1930, 1,650,000; 1940, 1,750,000.

On Other Pages

The considerable fall in 1920 was attributed to the "Short Depression." The significant fact is that in 80 years the consumption increased eightfold. The 26 countries to which those figures refer each annually contributes over 1000 tons of lead, on an average, and of the total produced, some 30 per cent is from Empire countries. The U.S.A. is the largest single producer followed by Australia, then Canada, with the U.S.S.R. fourth (on estimated figures).

The U.S.A. consumes about half the world production of lead, and as this remains a strategic commodity vitally associated with a rearmament drive which has by no means reached its zenith, no fall in demand can be anticipated. Moreover, purchases for a strategic stockpile have hardly commenced.

The serious view of the increasing shortage taken by the U.S.A. is reflected in the fairly intensive prospecting drive undertaken since the end of the war. In comparison British efforts to find new fields to supplement the known reserves (British Columbia, 3.4 million tons; Broken Hill, N.S.W., 2 million tons) have been at the best half-hearted. A sufficient explanation for the relative British inaction resides in the fact that the number of registered consulting engineers is now less than half what it was 25 years ago.

Before the 1914-18 war, prospecting was based on London, as were so many other enterprises which called for a mixture of speculation and genius but which held out a prospect of fair reward for capital invested. To-day, the incentive of reward in itself is apt to be regarded with disfavour. This attitude specially applies to prospecting in unexploited territories with a view to their development for metropolitan interests.

To an otherwise extremely sombre picture there is at least some satisfaction to be derived from the knowledge that great strides are being made in geophysics and geochemistry which must aid the prospecter. It is also heartening to hear some evidence that there is active prospecting in East and West Africa. The operative word here seems to be "active" as opposed to "intense." That is the interpretation of what is now taking place, given in semi-official quarters to THE CHEMICAL AGE this week.

From the evidence so easily available one would have liked to have been able to record "intense activity," enthusiastically sponsored, officially as well as unofficially, with an unequivocal guarantee of fair reward for enterprise and reasonable risk. More money spent on lead and a little less on nuts would represent a prudent investment policy.

NOTES AND COMMENTS

Radioactivity and Chemistry

SEVERAL more or less simultaneous announcements have encouraged the belief that an important change has been wrought in official policy in this country regarding what may be made public in the field of atomic physics. The best evidence is the news that the Atomic Energy Research Establishment of the Ministry of Supply is to collaborate with the Chemical Society in presenting at Oxford on March 28-30 what promises to be the most important symposium of British, American and European information on the chemical associations of nuclear physics and radioactivity that has yet been mustered. This will compensate largely—if rather belatedly—for the " stop " which had necessarily to be placed on these subjects at the ninth International Congress of Pure and Applied Chemistry in the Summer of 1947, by elucidating some of the fundamental concepts from which derived many of the practical manifestations of atomic science, in which so much interest has been fostered by current discussions. However revealing the forthcoming symposium may prove to be, there is no doubt that it will be authoritative. That is guaranteed by the names of the contributors, among whom are Dr. J. F. Anderson and J. Sutton (AERE), A. G. Maddock (Cambridge) and, from America, Prof. R. E. Connick (California University), and John W. Irvine (Massachusetts Technical Institute), and Dr. L. Yaffe and Dr. R. H. Betts from Canada's Chalk River establishment. Of the distinguished Continental contributors, Prof. O. Hahn, who will discuss emanation methods, has the distinction of having been one of the first of the leaders in this field, whose influence, but for Germany's wartime scientific policy, might have changed the course of history.

Bepo in Action

BRITAIN'S large atomic pile at Harwell —whose official title is whimsically abbreviated to " Bepo "—was used for the first time on Monday last for the production of radioactive isotopes, and the Ministry of Supply has announced that the first deliveries from this source will start early this month. When Bepo is operating at full power later this year, it will be able to produce all the artificial radioactive isotopes required in this country, not only by medical, but industrial and other research workers as well. More isotopes will also be available for export, and it is expected that a steadily increasing demand for them will develop overseas. In certain quantities they are available to industry now, and THE CHEMICAL AGE was informed by the Ministry that from the smaller pile (Gleep) it has been possible so far to meet all the demands from medical, industrial and all other quarters, but that, comparatively speaking, demand from industry had been light. The interesting fact emerged—to which no prominence has yet been given—that industrial firms which are in a position to employ radioactive isotopes, either in their own research departments or actually for application to their manufacturing processes may now be able to procure them by writing in the first instance to the Isotope Information Bureau, The Atomic Energy Research Establishment, Harwell, Didcot, Berks., from which advice or information is being made available. Thus, almost imperceptibly, a significant new phase has been reached in the gradual incorporation in the realm of industry of this potent factor, promising to bring about a virtual catalysis in scientific and industrial affairs. The contrast with the situation less than a year ago, when the gates of Harwell were gingerly opened for one day for the Press and some others, is sharply revealed by the statement now made that anyone practically concerned with the industrial use of radioactive elements may now, by appointment, be shown rather more of that promising activity at Harwell.

Atomic Energy News

MATERIALS irradiated in Bepo, says an official statement, will be 20 times more active than those so far irradiated in the first and smaller pile. Bepo, which first began to operate at Harwell in July, 1948, has a rated output of 6000 kW and was designed primarily for experimental purposes. The smaller pile, designed to develop about 100 kW of heat, started up in August, 1947, and has been producing radioactive isotopes since September of that year. Present production is about 150 specimens a month. Radioactive isotopes

have, of course, already been regularly delivered by Harwell to various research bodies, including hospitals, universities and industrial organisations, in this country and abroad. Meanwhile, a very tangible indication of the progress in popularisation in the U.S.A. in this direction is the first number of the *Atomic Energy News Letter*, which has just been received in this country. This periodical is stated to be devoted exclusively to "the business side of the atom," is non-technical, carries no advertisements, and promises to use all its space for the publication of reports of new products, new materials, and new equipment in the atomic field, both in the U.S.A. and at large.

Student Funds

THE Welfare of the students affiliated to the British Association of Chemists was informally discussed in a forum of the London section last week. While all were concerned with the desire to give encouragement and aid to the junior members, the best method of doing so produced widely divergent views. Suggestions ranged from a London Scholarship fund of £1000 with possible co-operation from one of the large industrial chemical firms, to raising small sums of money to supply books to students during pre-examination work. The curious anomaly was then revealed of large sums of money accumulated in the Unemployed Benevolent Fund which have remained untouched. Wise provisions had been made over past years to assist members should hard times and reduction in employment occur. Now, the chemists are faced, instead of lack of work, with the problem of finding and training enough young people to meet the increasing demand for technical exports. Some way must be found to release at least some of the funds lying idle to the benefit of those on whom the future of chemical profession and industry depends.

German Resilience

CHEMICAL output is rising virtually throughout the world and is surpassed only by the scale on which the widening of manufacturing capacity is being planned in what used to be, chemically speaking, the backward countries. Among the traditional suppliers, the United Kingdom's production achievement, of which some conception is afforded by last month's record exports, to the value of more than £8 million, is not unrivalled in Europe. The firm intention in Western Germany to endow chemical industries again with the decisive economic power they wielded before war production disposed of all sales considerations is again apparent in the further increase of 1 per cent in chemical production in December. Modest as that improvement may appear, the result to which it contributed is not—a total of 78 per cent in quantity, of the formidable output yielded in 1936 when German factories were unrestricted and unbombed. There have been fluctuations and some setbacks caused by the widely distributed problem of most industries, shortage of electric power, but the general trend, to which the Monthly Report of the Control Commission for Germany testifies, cannot be mistaken. In supplying basic needs of such things as sulphuric acid, of which the year's total of 619,600 tons was an increase of more than 50 per cent above 1947's, caustic soda (+75 per cent), and coal-tar dyes, which attained a post-war record, German industry has shown recuperative power which, with unstinted American aid, may produce a potent factor in European economy in the immediate future.

BERYLLIUM POISONING

REGULATIONS made by the Minister of National Insurance, Mr. James Griffiths, published recently, add beryllium poisoning to the list of industrial diseases scheduled under the National Insurance (Industrial Injuries) Act. Now, any employed person who contracts beryllium poisoning, which is essentially an occupational disease, may claim industrial injury or disablement benefit, and death benefit may be paid if the person dies.

The announcement follows a recent report of the death from beryllium poisoning of a London physicist who had worked experimentally on fluorescent lamps (THE CHEMICAL AGE, 59, 778).

A large part of the beryllium used in this country is, we understand, imported, not separately but already alloyed with copper, the latter forming something like 95 per cent of the alloy. The poisoning risk, therefore, would appear to be small, except in the chemical manufactories where the compounds are made, such as beryllium oxide, beryllium fluoride, etc., where protective measures are in force.

U.S. AID FOR COLONIAL DEVELOPMENT

Funds and Technicians for New Survey

AFTER many months' discussion, it was announced simultaneously in London and Washington on February 23 that the Economic Co-operation Administration had approved the British Government's proposal to expedite the completion of geological and topographical surveys of certain British Colonial areas by the employment of American geologists, chemist-assayers and topographical engineers. Some 50 American specialists are likely to be engaged in the work, in support of which ECA is setting aside £1.5 million and the United Kingdom will provide £420,000.

As announced in Parliament and the Press, it is expected that 24 to 30 geodetic engineers will be made available for the reconnaissance, mapping, by aerial survey. They are to be attached to the Directorate of Colonial Surveys which is already engaged in photographing and mapping large parts of Kenya, Uganda, Tanganyika, Northern Rhodesia and Nyasaland.

The value of this undertaking to future geological studies in these areas where it is already known that deposits of copper, lead, tin, iron, phosphates and other minerals exist, is obviously important.

The British Government has also requested the temporary attachment of 19 geologists, three petrologists and three chemist-assayers for a period of three years. They would be assigned to the various surveys already commenced in Nigeria, the Gold Coast, Sierra Leone, all the East African territories and also in Borneo and British Guiana. The minerals known to exist, or already being produced, include coal, gold, iron, tin, columbite, bauxite, diamonds, manganese, chromite, platinum, tantalum, copper, oil, soda, kyanite, mica, lead, kaolin and tungsten.

The U.S. Geological Survey will act as agent of the ECA in recruiting the geologists petrologists and chemist-assayers. Arrangements for the recruiting of the topographical experts are now being made.

Mistaken Policy

The factors in earlier policy of mineral exploitation which have rendered it desirable now to accept American leadership are discussed by a special correspondent of THE CHEMICAL AGE who has been closely associated with the subject for many years. He writes:—

In the early days of the war—during the "phoney period," a joint meeting of the Geological Society and the Institution of Mining and Metallurgy was held, at which representatives of the Colonial Office attended, by special invitation. A motion was passed, which was tantamount to a censure of the neglect of the Colonial Office of the respective Colonial Governments Geological Surveys, with all that was thereby implied.

With very few exceptions, there can be no balanced national economy without developed mineral resources, and it was notorious that mineral bearing parts of colonial territories in Africa could, if exploited, do much to alleviate local distress and chronic backwardness.

The crux of the matter was, of course, the dearth of trained geologists, a situation which in itself was largely due to the lack of inducement. Enlarged and lively Colonial Geological Surveys would provide some sort of an answer to those who realised only too well that England was rapidly losing the lead which she held almost by tradition and certainly by achievement.

Little Enterprise

Until the time of this somewhat momentous meeting, the treatment of Colonial geographical surveys was characteristic of the totally unrealistic attitude of Parliament to the Colonies as a whole; an attitude of nonchalance and *laissez faire* which gave justification for criticism by other European countries without colonies, of our lack of initiative.

However, the Colonial Office did mend its ways to some extent; specialists were recruited and the geological surveys appreciably enlarged. Geologists were not only absorbed from British Universities but also from the Dominions, notably from South Africa. It was a happy augury that it was at last recognised that the Stellenbosch and Witwaterssand Universities, in particular, were turning out really first class geologists. (Several are now employed by the Nigerian Geological Survey.) It is revealing that the Tsumeb Corporation and the Okeip copper mines in the mandated territory of South-West Africa, both of which are virtually American owned, very largely rely upon South African trained experts.

It is an open secret that the Colonial Geological Surveys would have liked to have had the benefit of men graduating from Canadian Universities, McGill in particular, but that attempts to gain such desirable material were abortive. The reason for this failure is more than likely due to

the parsimonious treatment of geologists and mining engineers by the Colonial Government in comparison with that of the oil companies and mining companies.

In so far as the Canadians were concerned, it was strongly rumoured in Montreal at the time that the British Government was not prepared to pay expatriation differential allowance. It was also said that had proper and sympathetic consideration been given to the fact that the men sought would have to work many thousands of miles from home in the most arduous circumstances, there would have been no lack of men. But there were quibbles about currency regulations in respect of the proposed rates of emoluments and similar relatively unimportant points.

Allowing for the lack of sagacity shown by responsible authorities during the war who would not regard the training of mining engineers and geologists as being priority professions in the national interest, there is still a shortage, partly because the rewards offered by the Colonial Government are insufficient to attract the right type of man.

Unfair Remuneration

Arising out of this question of remuneration, it is interesting to note that $1.5 million, plus another £420,000 from the counterpart fund is required to pay the salaries of the American personnel and for the sterling expenses involved in the proposal. This sum will be over and above the amount allocated to the U.K. for the procurement of commodities.

It requires little calculation to arrive at a rough estimate showing that the American personnel will receive monthly cheques (presumably in U.S. dollars) equivalent to twice the amount of those received by their British colleagues.

One has no need to be a psychologist to realise that when men are working side by side for several years on end in primitive countries with the stress of trying climates and other difficult local conditions, harmony is imperative if the maximum benefit of their work is to be realised. Vast discrepancies in pay and other working conditions will not be conducive to this desideratum. Such difficulties could have been avoided if more attention had been paid to the potentialities of our own and Dominion Universities.

In announcing approval of the proposal, Mr. Henry Siegbert, Acting Chief of the ECA Mission to the U.K., asserted that the expediting of the two surveys in basic to the expanded development of new sources of wealth, especially of raw materials which are in short supply throughout the world and which would make valuable contributions not only to British, but also to European, recovery. At the same time, he said, increased world availabilities of these materials would aid the economy of the United States. Elsewhere in this issue reference is made to the serious shortage of lead—no doubt the U.S. share our anxiety in this respect and it is only to be hoped that the British and American teams operating in the Colonies, now with the aid of American funds, will be enabled to alleviate this shortage.

Titanium Records in 1948

U.S. Demand Outstrips Increased Supply

THE titanium industry in the U.S.A., prominent in 1948, became the focus of further attention when the Kennecott Copper Corporation and New Jersey Zinc Company revealed that they were to exploit a large deposit of ilmenite in Quebec, Canada. E. I. Du Pont de Nemours & Co., Inc., also announced its intention to undertake large-scale production while considerably increased use of titanium was forecast, if the cost could be substantially reduced.

Production and shipments of ilmenite in the U.S.A. have shown a steady rise since 1944 according to a preliminary study just completed by the Bureau of Mines of the U.S. Department of the Interior. The National Lead Company mine at Tahawas, New York, maintained its position as the leading ilmenite producer.

The Du Pont operations at Starke, Florida, are expected to begin during the first half of this year.

Mounting Imports

Imports of ilmenite for 1948 are expected to be the highest achieved, except in the two peak periods in 1939 and 1947. For the eleven months, January to November, the total was nearly 228,000 tons according to the U.S. Department of Commerce. India supplied 177,600 tons; Norway, 33,600; Brazil, 8700; Canada, 4500; and British Malaya, which featured for the first time as source of supply to the U.S.A., 3300.

Rutile production declined by 17 per cent from the record of 1947, but shipments, on the other hand, were nearly double the figure for that period, reaching a total of 10,300 short tons. Imports for the first eleven months of 1948 were 8700 tons, practically the whole of which came from Australia.

Despite all these achievements in the industry, output failed to satisfy all the demands for titanium, and further extensions to plants are in prospect this year.

CHEMICAL FIRE SUPPRESSORS

German Wartime Material and Appliances

GERMAN methods of fire control form the subject of the British Intelligence Objectives Sub-committee Overall Report No. 18 which has just been issued.

The report prepared by J. F. Fry, Department of Scientific and Industrial Research and the Fire Office's Committee, Joint Fire Research Organisation, brings to light some interesting features in German fire equipment which showed development on somewhat different lines from those followed in the U.K., although no particularly outstanding contributions to fire-fighting seem to have been made in Germany during the war years, 1939-45

In the employment of fixed fire protection apparatus importance was attached to the use of chloro-bromo methane (CB) in conjunction with carbon dioxide and nitrogen. The object was to obtain a material similar in characteristics to methyl bromide, but less toxic. CB inhaled in large quantities produces effects similar to those produced by chloroform, but has no after effects; it is formed by the action of bromine on methylene chloride in the presence of aluminium.

In the field of stationary equipment for protecting oil tanks with air foam, German developments were not outstanding.

The Total Company produced a fixed foam branch which was simply an adaptation of their normal foam branch pipe (the "Komet"), fitted with flanges and inserted in a vertical pipe attached to the wall of the tank to be protected.

Central pumping stations, delivering air foam to a number of tanks were not common, either in Britain or Germany, although systems of the type using chemical foam were used in both countries.

German Lead

Up to and including the early part of the war, the Germans, to some extent, led the way in the development of foam compounds and in the study of the mechanics of fire extinction by foam.

Workers in these fields in Great Britain were aware of the normal Sthamer process for preparing protein compound and they had some knowledge of the work of Amsel and Brunswig on the study of foam; they were therefore prepared to find that German developments had maintained the lead.

It was found, however, that little scientific work had been done in addition to that already known, while British investigations had in the meantime advanced beyond this stage.

To form a fair valuation of the compounds and equipment in Germany it was found necessary to devise standard tests for the foam produced. These were based on the work of Amsel, Brunswig and Friedrich, and the properties normally measured were :—

(1) Foam number (corresponding to the British "expansion ratio").

(2) Fluidity (or viscosity).

(3) Stability at atmospheric temperatures as indicated by the "half water time," *i.e.*, the time taken for half the total water content of the foam sample to drain out. (This has not been used in any British investigation).

(4) Resistance to radiant heat (devised by Amsel and adopted in modified form by British investigators).

(5) Covering quality as indicated by the ability to withstand the pressure of petrol vapour produced beneath the foam blanket (this is not measured when testing foams in Britain).

Wartime Products

Foam compounds known to have been available in Germany before and during the war are :—

(1) The Schaumgeist types manufactured by Sthamer, of Hamburg. These were prepared from 65 per cent hoof and horn meal until 1943, when Schaumgeist 43 was introduced; in this product sulphite lye liquor (from the manufacture of paper) was substituted for two-thirds of the hoof and horn meal. The use of this sulphite lye, originally a war-time device as a substitute for scarce materials, may prove useful in reducing the cost of such compounds.

(2) The Tutogen types, manufactured by I. G. Farbenindustrie, of Frankfurt. Tutogen N and E were stated to be prepared from hoof and horn, the former being the normal type and the latter specially for use on alcohol fires.

(3) Leukogen, produced for a short time by Chemische-Fabrik, of Ludwigshafen (no detailed information available).

(4) Kometextrakt, manufactured by Total A.G., of Apolda, believed to have been an aluminium protein compound, never produced on a large scale.

No attempt was apparently made in Germany to produce protein foam compounds from blood, as produced in Britain by the Chemical Research Laboratory, or from vegetable materials, such as the soya-bean method used in America.

Chemists and Administrators

Still Classes Apart

SOME forthright and interesting views on whether the good chemist can be an efficient administrator were expressed in the forum held by the London section of the British Association of Chemists in London last week.

The position of the chemist as a consultant was stressed by the opening speaker, who claimed that a technician so employed was entitled to be on the board and take his share in the administration. The executive, he complained, was all too frequently entirely in the hands of business interests.

Next it was claimed that his scientific training made it possible for the chemist to fit into any side of industry, but that he should have greater freedom. In most firms rigidity was such that, once a chemist was employed in any particular branch, it was almost impossible for him to get a transfer.

Human Relationship

The chairman, Mr. H. T. F. Rhodes, revealed that he was apparently that *rara avis*, a practical chemist who had turned administrator. He agreed that the organisation should not be solely in the hands of financial experts, but submitted that human relationship must play a big part in control of any industry, and this fact the keen chemist, immersed in his laboratory, was apt to overlook.

While admitting that the chemist did not always get a fair chance, the next speaker emphasised that a company or industry must be financially successful, therefore those on the board must understand finance, law, advertising, etc. It was frequently simple to manufacture a certain product, but hard to sell it.

Complaint had been made that an accountant should have so disproportionately large a share in the direction of industrial effort. This, though, was only reasonable. Financial limits had to be observed, and the technician, in his enthusiasm and without an understanding of finance, might not respect the necessity to confine research to what was financially practicable.

The general view of the meeting appeared to be that the better the chemist the more he tended to be tied to his laboratory and the less equipped was he with the broad outlook and understanding of human relationships essential in good administration.

This did not, of course, mean that science should be sacrificed to finance and "big business," and the position of the chemist, particularly in a consultative capacity, must be zealously guarded.

The Export Drive

Revised Figures for End-1949

AN end-1949 target for the United Kingdom industry of 155 per cent of the 1938 volume of exports is announced by the President of the Board of Trade.

Preliminary targets had been discussed with industry and the group targets supplemented by a large number of targets for individual industries. The provisional figures announced last October remain unchanged except in a few cases.

The task set the chemical industry of £9 million (monthly rate) is £950,000 higher than the end-1948 target and 198 per cent by volume of the figure for 1938.

One of the main changes is the increase of the iron and steel target from a monthly rate of £9.1 to £10.5 million, or 138 per cent greater by volume than the 1938 totals. This adjustment is partly due to increased supplies which are being planned, for example, to the Colonies, and partly to price changes, since export prices in the iron and steel group as a whole increased during 1948 by more than the 5 per cent allowed for in the preliminary list of targets.

BRITISH COUNCIL CHANGES

A NUMBER of changes in specialists' committees of the British Council, including the resignation of Sir Henry Dale, formerly chairman for seven years of the Council's Science Advisory Committee, are reported by the council.

This states that recent discussions between the British Council and the Institutions of Civil, Mechanical and Electrical Engineers have led to the dissolution of the Engineering Panel, and the council will in future be advised by the secretaries of these three engineering institutions, backed by their organisations. At the same time Sir William Larke resigned from the Science Advisory Committee, on which he had served for eight years, in order to enable the British Council to invite the presidents of these institutions to serve on the committee as the representatives of engineering.

The present membership of the British Council science Advisory Committee (some vacancies having yet to be filled) is :—

Engineering : Sir Jonathan Davidson, Captain W. Gregson, and T. G. N. Haldane.

Medicine : Sir Edward Mellanby, Dr. E. A. Carmichael, and Dr. G. L. Brown

Agriculture : Prof. J. A. Scott Watson.

Other sciences : Prof. J. T. Randall.

The Royal Society : Prof. E. D. Adrian, Prof. A. V. Hill, and Prof. H. R. Robinson.

THE NEW OPTICAL COMPONENTS

Artificial Sources of Prisms and Lenses

From a Special Correspondent

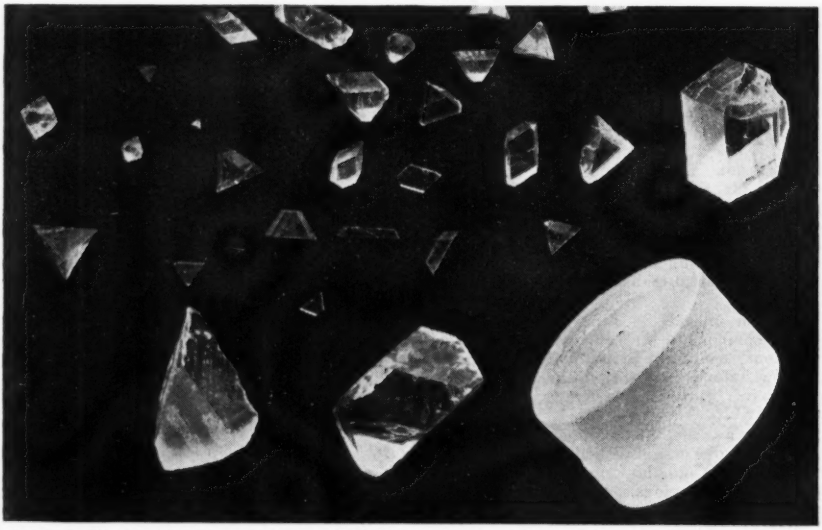
FURTHER information has been made available concerning the relatively highly developed industry in the U.S.A. for the production of optical crystals for a variety of purposes from natural salts, and especially sodium chloride, lithium fluoride and potassium bromide (THE CHEMICAL AGE, *59*, 722).

The processes command a heightened interest from the special adaptability of the optical components made from these synthetic crystals, each of which is some 250 mm. in height and 190 mm. in diameter, facilitating new techniques in infra-red and ultra-violet spectroscopy, infra-red photography and related fields.

Purification of the raw materials occupies an essential place in the production procedure, and the purification step is made possible because of the unique chemistry of lithium as compared with other halides. Chemical impurities in the salt may cause discoloration, cloudiness, or gas occlusions in the final crystal.

Generally speaking single crystals are not difficult to "grow," owing to the extremely high heat of fusion of the salt. Control of

Gauging a sheet of silver chloride made from a single crystal



A group illustrating the variety of synthetic crystal forms which can be produced from calcium chloride

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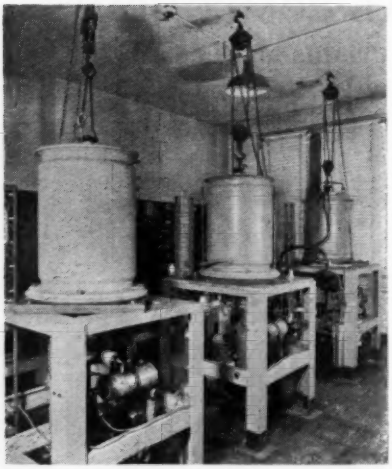

Vacuum insulated electrical resistance furnaces in which the salts are fused

crystallisation rate is also easily obtainable. Yet lithium fluoride should be grown under particularly high gradient to effect the necessary additional purification during growth.

For the purpose of ultra-violet spectroscopy, optical lithium fluoride can be substituted satisfactorily for fluorite. The changes in transmission, due to irradiation with ultra-violet light, are about the same as are experienced with fluorite.

For ultra-violet, particularly low ultra-violet, work, lithium fluoride should show transmission approaching the theoretical value. It is also desirable that all the prisms used should be kept of small size, and that windows and lenses should be as thin as possible. Transmission in the infra-red starts falling off rapidly at 7 microns. In prisms, useful transmission is obtained to 5 microns.

Lithium fluoride is a particularly appropriate component for achromatic lens combinations, especially with quartz, owing to the low index of refraction and the low dispersion of lithium fluoride over the visible and near-ultra-violet range.

Up to wave lengths of 5 microns, the relatively high dispersion of lithium fluoride has made this a popular optical material in infra-red applications. It is also a valuable shutter material to cut off radiation beyond 7 microns, owing to the absorption of infra-red radiation.

Rock salt has long been a favourite material for infra-red spectroscopy, as it has excellent dispersion properties over its entire transmission range. On the other hand, it has been difficult to secure natural rock salt crystals of sufficient size and quality to provide the size of desired optics. This difficulty is, of course, absent when using the large synthetic crystals. An important factor here is that for several years the Russian supply to the U.S.A. has stopped.

Synthetic sodium chloride crystals (synthetic rock salt) are grown by the Harshaw Chemical Company up to 33 lb. in weight. As a result, 60° prisms, 4 to 4½ in. tall with faces up to 6½ in. can now be made; they are probably the largest sodium chloride prisms available. The quality of the synthetically grown material is stated to be superior to natural rock salt.

Lithium fluoride transmits to 7 microns in thin sections, as absorption coefficients show; yet as prism material, its effective range is up to only 5 microns.

In order to cover the infra-red range up to 25 microns, a spectrograph should be equipped to utilise prisms of lithium fluoride, sodium chloride and potasium bromide—each giving high dispersion in its effective range.

Potassium bromide and sodium chloride crystals have similar physical and optical characteristics. It is, however, more difficult to cleave large thin slabs of potassium bromide than those of sodium chloride.

Ease of Polishing

Sodium chloride can be polished more easily than potassium bromide; also potasium bromide crystals are bound to be more affected by changes in atmospheric humidity.

The furnaces used in the production of all these crystals follow the design by Stockbarger. There is a lowering mechanism for the crucibles consisting of a geared rack running vertically in line with the axis of the lower furnace. At the upper end of the rack is a supporting platform for the crucibles.

A speed reducing mechanism with a synchronous motor lowers the crucibles and the rack during the formation of the crystal at the rate of 1 mm. per hour. From a central control panel, both rates of lowering for the crucibles as well as furnace temperatures are automatically controlled within very fine limits.

Surgeon's Rubber Gloves.—The Board of Trade states that the restriction which limited the sale of surgeon's rubber gloves only to those holding a buying permit ended on February 28.

Metallurgical Section

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Corrosion of Metals

Microbiological Factors in Underground Corrosion

by Dr. W. H. J. VERNÓN *

IT has been estimated that the annual loss due to corrosion of the 450,000 miles of buried pipelines laid in the U.S.A. is of the order of £30 million. Available data show that in England and Wales there are 80,000 miles of water mains alone, which —making due allowance for probable errors involved in a *pro rata* conversion—leads to a corresponding figure of £5 million.

So far as this country is concerned, there is overwhelming evidence that the problem is very largely confined to pipes embedded in waterlogged but otherwise impervious clay.

Corrosion of cast iron takes the form of "graphitisation," perforation of a water main resulting when this extends to the thickness of the pipe wall at any place. This has been known to occur even within a year, and failures after five to ten years are common. We have the paradox therefore that this virulent attack is associated with conditions which, in the light of certain principles (discussed in another part of his paper by Dr. Vernon), should lead to freedom from corrosion, *i.e.*, they favour the exclusion of the oxygen which, in ordinary neutral environments, is necessary for cathodic depolarisation.

"Hydrogen Acceptors"

An explanation of the paradox was suggested in 1934 by the Dutch worker, von Wolzogen Kuhr, in terms of the possible action of anærobic sulphate reducing bacteria, *vibro desulphuricans;* on this view, the organisms, by acting as "hydrogen acceptors," provide a mechanism for the disposal of cathodic hydrogen (cathodic depolarisation)—a role normally filled by atmospheric oxygen. Some of the earliest work in this field was carried out at Chemical Research Laboratory by H. J. Bunker and his colleagues, and investigations are now being pursued intensively by Mr. K. R. Butlin.

Experiments in neutral solutions—oxygen being rigorously excluded—showed that corrosion occurred only in the presence of bacteria. In the sterile medium the specimens remained bright; inoculated, corrosion proceeded with pitting of steel specimens and characteristic "graphitisation" of cast iron.

The Cathodic Reaction

The views of von Wolzogen Kuhr are thus confirmed—at least, in principle. It is clear that the function of the bacteria must be, primarily, that of depolarising the cathodic reaction—*i.e.*, providing for the disposal of electrons that would otherwise accumulate in the cathode. But uncertainty still exists whether sulphate simply takes the place of oxygen in ordinary ærobic corrosion under neutral conditions, *i.e.*,

$$8\epsilon + CaSO_4 + 4H_2O \rightarrow Ca\,S + 8(OH)$$

or whether the "hydrogen acceptor" view should be taken more literally, so:

$$8\epsilon + CaSO_4 + 8H^+ \rightarrow CaS + 4H_2O$$

Significance may well attach to a recent observation—arising out of the finding that the organisms can develop with bicarbonate as the sole source of carbon. Under such conditions it was found that, if iron is not already immersed in the liquid, it is necessary to add hydrogen to the system in order that growth of the organisms can continue.

On either alternative it follows that the final cathodic product must be hydrogen sulphide. It is possible that this gives rise to a certain amount of anodic depolarisation; *i.e.*, iron ions leaving the anode, meeting with hydrogen sulphide diffusing from the cathode, are precipitated as iron sulphide at some distance from the anode surface.

It is unfortunately true that all the conditions for microbiological corrosion—exclusion of oxygen, presence of bacteria, of sulphate, and of other factors favourable for their growth—are provided by the majority of clay soils. Observations in the field have abundantly confirmed the conclusions reached from laboratory experiments.

Invariable symptoms and valuable diagnosis of the microbiological corrosion of

* Dr. W. H. J. Vernon, O.B.E., Senior Principal Scientific Officer, Chemical Research Laboratory (DSIR), in the course of the first Cantor lecture on "The Corrosion of Metals," before a meeting of the Royal Society of Arts, in London, on February 21.

buried metal systems are provided by the obvious presence of hydrogen sulphide when the system is first opened up, the local blackening of the soil due to the presence of ferrous sulphide, and the greatly increased concentration of bacteria in the immediate neighbourhood of the corroding metal. The investigations are continuing with the active and valuable co-operation of various water and gas undertakings and other public bodies.

In the apparatus used by Bengough and his collaborators for the study of corrosion under immersed conditions, the course of corrosion was followed by daily readings of oxygen absorption; there was also provision for the measurement of any hydrogen evolution. In neutral solutions the rate of corrosion depended upon the partial pressure of oxygen in the overlying atmosphere, *e.g.*, for oxygen it was approximately five times as great as for air. Similarly, the rate increased (proportionately over a wide pressure range) when pressures higher than atmosphere were employed.

Accelerating Oxidation

Various other methods for increasing the rate of supply of oxygen to the metal have been used by many workers. This may be achieved either by moving the water carrying the dissolved oxygen (Heyn and Bauer, Speller, Friend, *et al*), or by moving the specimens. The "whirlgig" apparatus used at the Kure Beach Testing Establishment (North Carolina) has recently been described by La Que; the "C.R.L. High Speed Rotor Apparatus" as used at Teddington, by Wormwell.

One important type of attack characteristic of certain conditions of service—particularly those of condenser tubes—is associated with the breakdown of films by very high local rates of movement or impingement of water carrying entrained air. To simulate this "impingement type" of attack, May devised his well-known "Jet Test," in which jets of high-velocity seawater are caused to impinge at close range upon specimens already immersed in seawater.

The simplest case is that of corrosion distributed uniformly over the surface with uniform depth of penetration into the metal. This is also the least dangerous case; indeed, unless æsthetic considerations or dimensional changes are important it rarely constitutes a serious problem in practice.

Localised corrosion, particularly in natural waters or neutral solutions, may arise from the presnce of a film or scale that is capable of functioning as a cathode when the underlying metal is exposed at any point. The dangerousness of the situation arises from the fact that oxygen reaching a large area of the metal surface that is functioning cathodically may directly contribute to the corrosion at the small anodic area; the "cathodic area" is "protected," but only at the expense of augmenting the attack elsewhere, the depth of penetration being correspondingly increased.

This is the normal explanation of "pitting," which, depending on the thickness of the section, may lead to more or less rapid perforation.

An important corollary is the part which the distribution of dissolved oxygen may play, either in determining the efficiency of the cathodes, the positioning of which is decided by other causes, or influencing the actual distribution of anodes and cathodes. This is the basis of the well-known "Differential Aeration Principle" associated with the name of Dr. U. R. Evans, by whose work it was largely established.

As we have seen, in neutral solutions corrosion is essentially a function of oxygen supply, but this is required and used only at the cathodes. The differential aeration principle states that cathodic areas will be encouraged where the concentration of oxygen is greatest, and, paradoxically, anodic places (where metal is attacked) will tend to flourish where the oxygen concentration is least.

As was shown, however, by Bengough and Wormwell, in solutions of alkali salts the effect of oxygen distribution is, in fact, exerted in virtue of its effect on the distribution of cathodic alkali. Initial starting centres may be innumerable, but the lateral spreading of alkali determines which persist and which are "stifled."

An entirely different form of localised attack is that of "inter-crystalline corrosion," which, as the name implies, represents a selective attack at the grain boundaries of the metal. It arises essentially from the condition of the basis metal as distinct from that of surface films, and is frequently, though not invariably, associated with the presence of residual stresses. (The inter-crystalline attack sometimes found in lead and certain stainless steels appears to be due to an intrinsic susceptibility at the grain boundary, independent of the presence of stresses.)

"Season Cracking"

In these cases the damage to the metal is entirely disproportionate to the amount of corrosion, which may be very small indeed. An outstanding example is provided by cold-worked brass, in which violent cracking may occur during storage ("season-cracking") particularly if traces of ammonia are present in the atmosphere. As

was shown by the early work of Moore and his collaborators, this can be prevented by a low-temperature annealing after fabrication.

Closely allied to this (static) "stress corrosion" is the phenomenon of "corrosion fatigue," the stresses in this case being external to the metal. Here, corrosion may be regarded as a trespasser upon what is essentially the field of the mechanical engineer.

As is well known, the "fatigue failure" of a metal is brought about—for what I believe are now well-established reasons—by the prolonged application of alternating stresses the maximum value of which may be well below the ultimate strength of the metal. In the presence of a corrosive environment—for reasons which, I think, follow broadly from principles we have already discussed—failure may occur at stresses of still lower numerical value.

In other words, the "corrosion fatigue limit" is less—sometimes very appreciably so—than the ordinary "fatigue limit" or "endurance limit." For our present purpose we may note that the amount of corrosion required to produce this effect, which may be very serious in its consequences, may be quite extraordinarily—from any other viewpoint insignificantly—small. We may also note that the type of failure is, in general, trans-crystalline—in contrast with that produced in (static) "stress corrosion," which is characteristically inter crystalline.

Metallic Change

At the other extreme, in terms of alteration of material per unit volume, we have the case where penetration of corrosion affects the "body" of the metal or alloy in a manner analogous with the geological process of "metasomatosis." Examples are provided by the so-called de-zincification of brass and the graphitisation of cast iron, under appropriate conditions of environment.

In extreme cases, while the external form may not have been affected at all, the underlying material may have undergone a complete change of composition. With brass, the change is from brass to what is virtually copper. It was shown years ago by Bengough and collaborators that the process normally consists in an attack on the copper-zinc solid solution as a whole, followed by re-deposition of copper *in situ* as pseudomorphs of the original crystals.

The graphitic corrosion of cast iron is probably a true selective attack, favoured by the strong electrochemical action between iron and graphite. Much of the iron is leached out altogether; the residue consists mainly of graphite with other insoluble constituents of the original metal and associated iron compounds which, when *in situ*, are characteristically in the ferrous condition.

Again, the original shape is preserved, but the "graphitised" portions are correspondingly light in weight; they may be cut with a penknife, and readily mark paper. This type of attack appears to be favoured by a local deficiency of oxygen in the ambient liquid. Thus, many cases have been reported of cast-iron objects having undergone "graphitisation" during prolonged deep-sea immersion; on being raised to the surface they have become hot to the touch—no doubt on account of the rapid oxidation of ferrous iron entrapped in the residue.

Independent of Oxygen

These examples of the graphitic corrosion of cast iron deeply immersed in the sea—under conditions in which the rate of oxygen supply must be excessively small—may well occasion surprise if one recals the virtual absence of corrosion that is normally associated with such conditions. Allowance must naturally be made for the time factor; *e.g.*, even the smallest rate of oxygen supply might be expected to produce tangible results if sufficiently long sustained.

Nevertheless, there are good reasons for believing that the anomaly is genuine and that a more fundamental cause is responsible. Corrosion at normal rates, in neutral solutions and without hydrogen evolution, has in fact been demonstrated in the complete absence of dissolved oxygen through the intervention of anærobic bacteria of the sulphate-reducing type; these organisms are known to flourish within certain areas of the sea bottom.

(A summary of the second Cantor Lecture, also by Dr. Vernon, will be published next week)

FRENCH IRON AND STEEL

AS a result of research completed in the U.S.A. within the past six months, more than 10 billion tons of hitherto unusable ore in the Lorraine district of France can now be used for making iron in blast furnaces, states Mr. Herman A. Brassert, president of H. A. Brassert & Co., the U.S. engineers acting as consultants to the French Government and French private steel interests. He said recently that immense reserves of siliceous, low-grade ores in the Northern Minette district of Lorraine, for example, could now be concentrated to a high degree.

BORON-TREATED STEELS

U.S. Metallurgical Studies in 1948

RECOGNISING that the capacity for hardening of some types of steel is materially improved by the addition of small amounts of boron, the U.S. National Bureau of Standards, following an intensive investigation, reports that the effectiveness of the treatment with boron depends upon the steelmaking practice and the amount and form of boron retained in the steels.

The optimum effect on "hardenability" is obtained when boron is added in the form of simple or complex ferro-alloys, commonly called "intensifiers," "special addition agents," or "needling agents," to thoroughly deoxidised heats in which the amount of boron recovered is within the range of about 0.001 to 0.005 per cent.

Depth of Hardening

Because one of the main purposes of alloying elements in steels is to increase the depth of hardening or hardenability, this significant effect of boron suggested the possibility that it might be substituted for a part or all of the strategic elements commonly used as alloying agents in steels.

During the war, to offset possible shortages of these critical elements, investigation was undertaken at the bureau to determine quantitatively the effects of boron on some properties of steels used for armour plate and other military applications.

The programme was divided into two main parts: (1) a study of the interrelationship between boron, carbon and allying constituents on some of the properties of steels made in the laboratory, and (2) a study of the properties of boron-treated steels of selected chemical composition made commercially under predetermined deoxidising practices. Special attention was also directed toward the development of spectrographic and chemical methods for the accurate determination of small amounts of boron in steel.

The work included a study of the cleanliness and structures of the steels as hot-rolled, normalised, and heat-treated. Determinations were made of the Austenite and McQuaid-Ehn grain sizes, hardenability (Jominy), notch toughness (Charpy impact) at room and low temperatures, and tensile properties at room temperature.

The investigation was extended with experimental steels to include a study of the effect of deoxidation practice and composition of ferro-alloys containing boron on the recovery of boron and its influence on the above properties; a determination of the recovery of boron on remelting in an induction furnace under both slightly and strongly deoxidising conditions; and the determination of the effect of boron on the transformation temperatures and weldability of some of the experimental steels.

Approximately 250 experimental steels were made as "split" heats in an induction furnace and 20 commercial steels as a split heat in a basic open-hearth furnace. Thus, a steel from each heat was prepared without boron (except in a few special cases) and used as a basis for determining the magnitude of the effect of boron on the mechanical properties.

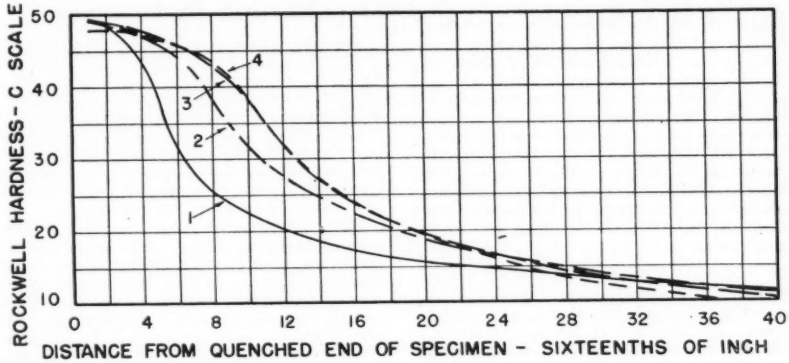
Boron was determined chemically by a distillation-colorimetric method, using phosphoric acid and tumeric, with an accuracy of plus or minus 0.0002 per cent of boron in the lower part of the range from 0.0005 to 0.006 per cent, and an accuracy of plus or minus 0.0005 per cent in the upper part of this range. The average difference between determinations by chemical and spectrographic methods was about 0.0003 per cent of boron.

Initially normalised specimens, quenched from the usually recommended temperature range, were subjected to end-quench tests for hardenability (Jominy method). Although the relative hardenability of the various steels is obtained by a comparison of the Jominy curves, it is considerably more convenient to show the magnitude of the hardenability effect due to boron (or other variable) from heat to heat by comparing the distances from the quenched end of the Jominy bars corresponding to the same selected hardness values or structures.

Comparisons of Hardenability

Comparisons, therefore, are made of the hardenability of the various steels on the basis of the distances from the quenched end of the bar for hardness values corresponding to both 50 and 95 per cent of Martensite.

Charpy impact tests for notch toughness were made with quenched and tempered specimens. Tests were carried out in duplicate at room and low temperatures in a Charpy machine of 224.1 ft./lb. capacity, with a striking velocity of the hammer of 16.85 ft./sec. The procedure for making the tests at low temperature consisted of cooling the specimens in an insulated bath containing equal parts of carbon tetrachloride and chloroform for a minimum of 30 minutes at the desired temperature, and then quickly



transferring to the impact machine and breaking.

The desired temperatures were obtained by regulated additions of solid carbon dioxide, and as this material passes directly from the solid to a gas, no dilution occurred in the liquid bath. The temperature of the cooling bath was measured by means of a copper-constantan thermocouple and an indicating potentiometer. Rockwell " C " hardness was measured on the fractured specimens at room temperature.

Variations from 0—0.006 per cent of boron additions made with either simple or complex intensifiers had no significant influence on the following properties of the steels: (1) cleanliness, except titanium or zirconium inclusions in some steels treated with complex intensifiers (non-metallic inclusions), (2) hot working (experimental steels), (3) transformation temperatures, (4) resistance to softening by tempering, (5) weldability (experimental steels), and (6) tensile properties of fully hardened and tempered specimens, except possibly an improvement in ductility when tempered at low temperatures.

Boron lowers the coarsening temperature of Austenite. However, steels with relatively high additions of boron can be rendered fine grained at heat-treating temperatures by the judicious use of grain-growth inhibitors such as aluminium, titanium, and zirconium.

Notch Toughness

The influence of boron on hardenability and on notch toughness (Charpy impact, V-notched specimens) of fully hardened and tempered steels varied with the base composition of the steels, the composition of the intensifiers, and the amount of boron present. The increase of hardenability due to boron was greater for basic open-hearth than for experimental steels prepared in an induction furnace. The notch toughness at room and low temperatures of the commercial steels fully hardened and tempered at high temperatures was also superior to that of the experimental steels of similar composition heat-treated alike.

The hardenability, as determined by the end-quench test, of many of the experimental and all the steels comprising a basic open-hearth heat was markedly improved by additions of boron. However, no definite correlation was found between the hardenability effect and the amounts of boron added or retained in the steels.

Complex Intensifiers

In many of the experimental steels the optimum hardenability was obtained with small additions of boron (0.001 per cent or less retained), while in other steels the hardenability increased continuously with increase in boron. In other steels, the addition of boron as a simple or complex intensifier was either without effect or impaired the hardenability. In general, relatively small additions were more effective than large, and the complex intensifiers were more effective than the simple ones.

The effectiveness of boron in enhancing the hardenability increased with the amounts (within limits) of manganese, chromium, and molybdenum. The hardenability of the boron-treated steels also varied with the state of deoxidation of the heat, and the final nitrogen content. High soluble nitrogen (and possibly oxygen) was detrimental to the boron effect on hardenability, but it was possible to retain the effect in high-nitrogen steels (low-soluble nitrogen) by fixing the nitrogen with strong nitride-forming elements such as titanium or zirconium.

For the commercial steels, the magnitude of the hardenability effect was independent of the amount of boron added or retained and

the composition of the intensifiers. The hardenability of some of the experimental and commercial steels treated with boron was affected by variation in quenching temperatures. In certain steels, the degree of hardenability was enhanced by increasing the quenching temperature above the usual recommended range, whereas in other steels the hardenability was not affected or was decreased by this change. The magnitude of the hardenability effect due to boron appears to depend upon the form in which it exists in Austenite, not necessarily upon the total amount present.

The addition of small amounts of boron was often beneficial to the notch toughness at room temperature of the steels when fully hardened and tempered at low temperatures. When the steels were fully hardened and tempered at high temperatures the presence of boron, especially as relatively high additions with intensifiers containing titanium, was usually either without effect or was detrimental to notch toughness at room and sub-zero temperatures. Appreciable amounts of boron were retained in steels after remelting in an induction furnace under both normal and highly oxidising conditions.

Improved Boron Carbides

Successful Use of Phosphorus

IN the manufacture of boron carbides generally and especially with B_4C a certain amount of free carbon is left in the product, which represents a rather serious defect. A claim to have overcome this, by incorporating phosphorus, is made in the English patent application No. 13255/1948, Conv. date 23.5.47, by F. Swarovski. The difficulty may also be minimised by using very pure carbon, though this is often unsuitable and expensive. In the present invention it is possible to use coke, either gas- or petroleum-coke, with boric acid or trioxide and some phosphorus or its compound. The last may amount to 20 per cent, or less, according to the amount of iron present.

Iron is generally present as an impurity, and is largely responsible for the formation of free carbon in the product; by including some phosphorus it is possible to manufacture carbides containing up to 30 per cent iron. Boron carbides thus prepared are of high quality and uniformity. These properties can be improved with carbides richer in boron than those corresponding to B_4C.

Mining in Norway

Metallurgical Industries' Expansion

THE memorandum on Norway's long-term investment programme, which the Ministry of Commerce recently submitted to the OEEC in Paris, contains a number of references to a noteworthy expansion of that country's mining and of its metallurgical industries. For instance, it is planned to rebuild completely the Spitsbergen coal mining installation, which yielded 300,000 tons of coal in 1938, so that output would reach no less than 500,000 tons by 1950. The achievement of this aim would result in a considerable saving of dollars. The mining installation in Sydvaranger, the northernmost port close to the Russian frontier, which was entirely destroyed during the war, is to be completely reconstructed by 1952-53 in order to supply world markets again with Norwegian iron-ore.

The output of iron and steel in Norway is to be increased gradually, and the State iron works in North Norway (capacity 550,000 tons) is to be completed by 1953. Of special interest is the proposed expansion of the aluminium industry, in which output is to be stepped up within four years from the present level of about 30,000 tons to 95,000 tons. The electro-chemical industry, production of which already exceeds the pre-war level, is to double its output by 1952 and ship additional quantities of fertilisers to European markets.

SAVING STEEL & MANPOWER

A FOUR-DAY conference on welding as an aid to saving steel and man-power has been organised by the Institute of Welding and the British Welding Research Association and will be held at Ashborne Hill, near Leamington Spa, Warwickshire, from March 22-25.

The proceedings on the first day will include an opening address by Sir Andrew McCance and the morning session will be devoted to machine tools and welding; in the afternoon Sir Charles S. Lillicrap (director of Naval Construction, Admiralty), will be chairman and the subject "Welding as Applied to Shipbuilding."

"Welding as applied to Railways and Rolling Stock" occupies the morning of Thursday, while Sir Charles Goodeve (British Iron and Steel Research Association) will be chairman in the afternoon, and the subject welding as applied to general and constructional engineering.

The final session will hear reports by rapporteurs and a statement will be drawn up arising from the conference.

WORLD SUPPLIES OF MERCURY

Substitutes May Diminish Demand

NATIVE mercury occurs only as a decomposition product of cinnabar in the upper portion of the deposits of the mineral, and then usually in such small globules that it is not a commercially important source of the metal.

ITALY'S OUTPUT

A CURRENT news item states that Italy's mercury output, which fluctuated between 120 and 140 tons in the first four months of 1948, amounts at present to about 96 tons per month, which compares with a monthly pre-war average of 193 tons. The Monte Amiata group, Italy's leading producer, reports a surplus of labour, which increases production costs considerably. This group has on hand large stocks of mercury and states that it does not intend to increase them.

The principal ore regularly worked for mercury is the mineral cinnabar, or sulphide of mercury. When not mixed with organic matter, which turns it dark, this mineral is distinguished by its bright red colour, high specific gravity and softness. Cinnabar occurs in eruptic rocks and in sedimentary rocks of all ages, states *The South African Mining and Engineering Journal* in an informative article, from which the following particulars are taken.

The world's principal deposits of cinnabar are at Almada in Spain, Idria in Carniola, Monte Amiata in Tuscany, Nikitowka in South Russia, and in various parts of California, including New Almada and New Idria. There are also deposits in Mexico, Hungary and many other countries. At one time extensive deposits were worked at Obermoschel and Landsberg in Germany.

World's Richest Mine

The deposits of Monte Amiata, in Italy, are very large, and ores carrying as little as 2 per cent of mercury can be profitably worked. The richest mine in the world however, is at Almada, in Spain, where the cinnabar deposits are known to have been worked as early as 315 B.C.

Here cinnabar occurs mixed with bituminus matter and iron pyrites in three beds of quartsite of the Silurian and Devonian age. There are three ore shoots each about 1000 ft. long with an average width of about 12 ft. The richest ore contains about 25 per cent of mercury.

In 1938 world production was estimated at 5200 metric tons, an increase of 11 per cent over the previous year's output. In 1935 Spain furnished 3 per cent of the total world production and Italy 28 per cent, while in 1938 the proportions were: Spain 28 per cent; Italy 44 per cent.

A joint selling agreement, temporarily interrupted by the Spanish war, gave these two countries a virtual dictatorship over world prices.

Price Fluctuation

Before the last war, an unsatisfactory feature of mercury supplies—to countries dependent entirely on imports of this mineral—was the very wide fluctuation in price. By the end of 1939 the price had soared from the pre-war figure of £17 to £40-£45 a flask (of 75-76 lb.), rising the following year to £50-£55 a flask. During the first world war it exceeded £100 a flask for a short period, while the Spanish War had the effect of sending up the price by approximately 20 per cent.

The high prices ruling in 1939, together with the critical dependence on Spain and Italy of the United Nations, and the high level of wartime demand, led to an intensive search for new deposits and the expansion of production from existing sources of supply.

Authentic information regarding production of mercury in Spain is still not yet available, and is only just beginning to trickle through from Italy, but there were indications that in 1941 and again in 1942 new records for world production were established, the 1943 output showing a slight decline.

Production of mercury in Canada soared from six flasks in 1939 to 2024 in 1940, 7057 in 1941 and 13,470 in 1942. The development of the mercury deposit in the Pinchi Lake area, Central British Columbia, by the Consolidated Mining and Smelting Co. of Canada, gave the British Empire its first important producer.

The small initial plant installed by the company was twice enlarged, and in 1942 was reported to be capable of handling 500 tons of ore daily, the mercury content of the treated ore being from 0.5 to 0.75 per cent. In 1943 an output of 22,487 flasks made the Consolidated mine the largest mercury mine in North America.

In 1942 Bralorne Mines, the largest gold

producers in British Columbia, became interested in developing a mercury property in the Omineca mining district. Several flasks of mercury were also produced at the Red Eagle group on Yalakom River, 30 miles north-west of Lilloet.

Mexico also played an important rôle in the solution of the mercury problems of the United Nations, the output there rising from 11,653 flasks in 1940 to 32,443 flasks for 1942.

New Zealand Sources

Investigations of cinnabar occurrences by the New Zealand Mines Department were reported to have indicated that a small but worth-while tonnage of high-grade ore could be developed, though only the deposit at Puhipuhi appeared to be capable of sustained production. In 1942 five tons of mercury were produced from this district, where operations were resumed by Mercury Mines, after having been suspended for many months because of a huge landslide on the property.

First worked 20 years ago, these mines are said to be capable of supplying the major part of the mercury requirements of Australia and New Zealand. Development work at the Ascot Mine at Karangahake (Haukari Range) was also expected to result in production of a small tonnage of ore.

Several other discoveries of mercury ore have been made from time to time at various locations, but these have not been large enough to justify exploitation.

At the beginning of the war a certain amount of anxiety was felt in South Africa regarding supplies of mercury. The problem was happily solved, however, by the development of a deposit at Monarch's Kop in the Murchison Range, where cinnabar is found in chlorite-carbonate schist, the strike being several hundred ft. long.

In 1940 a Johannesburg syndicate started intensive development of this deposit, and in June of the same year mercury was commercially produced for the first time in the Union's history. By June, 1941, production at Monarch's Kop had reached a level of 800 lb. monthly, and in 1942 was not far short of the Union's requirement.

For several years production at Monarch's Kop continued to expand. This new industry reached its peak in 1945 with an output of 64,789 lb., of which local sales accounted for 32,100 lb., and a valuable export trade with India was developed. In 1946 output amounted to 58,093 lb., but in 1947 there was no further production.

Since the war mercury producers have been faced with a critical problem of oversupply. Owing to lack of demand for this mineral, the Pinchi Lake mine in British Columbia, for example, in July, 1944, closed down with large stocks of metal still unsold. During the war this mine turned out 1200 tons of mercury, producing in its heyday about 65 tons monthly.

Discussing the post-war outlook, the *Minerals Yearbook* pointed out that in recent years there has been a trend away from the use of mercury for certain purposes.

Plastic and copper oxide paints are competing with mercury for antifouling substitutes, while certain pharmaceutical uses might also be captured by substitutes.

The opinion was expressed, however, that on the whole the place of mercury in the industrial future was assured, at least at former levels. In the upshot this cautious analysis of the post-war outlook appears to have been unduly optimistic, for at present the outlook for mercury producers is most unpromising.

"Although these figures do not seem alarming," states the *Mining Congress Journal*, "they do not show the surplus metal accumulated in the preceding year which had to be absorbed, nor can they reflect the depressing influence on the price caused by unrestricted offerings of cartel metal by the Europeans, by the distress lots offered at 'a price to get the business' by 'dollar-shy' nations, or by offerings by Government agencies awarded at well below market prices."

As previously pointed out, the price at the end of 1947 was below the average for 1936. Costs in mercury mining have followed the trend of all other costs. It is estimated that the cost of mining and treating a ton of mercury ore increased at least 10 per cent in 1947 and is about double the cost of 1936.

In the Union of South Africa and elsewhere mercury producers made a contribution of the greatest importance to wartime production, and it is regrettable that the future prospects for suppliers of this critical material should be so unfavourable.

AUSTRALIA'S COAL

THE Joint Coal Board in Australia plans to expand the output of existing New South Wales coal mines and open new mines in an effort to meet a demand of between 16 and 17 million tons of black coal by 1952, according to the Australian News and Information Bureau in New York. Four main devices are to be employed to increase production. These are: Stabilisation of the industrial situation. (In 1947 industrial disputes cost the industry 1539 million tons of coal, and in the first half of 1948, 895,000 tons); the elimination of technical bottlenecks; the development of open-cast production; the fundamental reorganisation of the layout and equipment of old and new underground mines.

British Steel Casting

U.S. Company Installs Special Plant

THE completion of a $500,000 plant addition, for the production of special alloys by British processes recently acquired by exclusive licensing agreement, has been announced by Mr. William H. Worrilow, president of Lebanon Steel Foundry, Lebanon, Pennsylvania. Doubling the company's high-alloy steel casting facilities, the new plant and equipment will permit the manufacture of high-temperature alloy castings under the patented techniques developed by Firth-Vickers Stainless Steels, Ltd., of Sheffield.

The Lebanon Steel Foundry already is using exclusively the Firth-Vickers method for the production of super-alloy castings needed for warplane jet engines.

Specially designed for this project, five new centrifugal casting machines will be employed, three of vertical type and two horizontal. The five machines are designed together to encompass all phases of centrifugal casting. One unit has the capacity to spin at a single pouring a combined load of 10,000 lb. of molten metal and die, at a maximum speed of 1200 revolutions per minute. Each of these new spinning machines is equipped with special shafts and bearings and electronic controls governing operation at any desired speed of rotation, and assuring variance no greater than two per cent at maximum operating speed.

The Lebanon Steel Foundry is a leading supplier in the U.S.A. of stainless special alloy and carbon steel castings for use in the oil, textile, mining, chemical, paper and pulp, and aviation industries.

Metal Institute Medallist

The Institute of Metals Medal (in platinum) for 1949 has been awarded to DR. WILLIAM HUME-ROTHERY for his contributions to the science of non-ferrous metallurgy. The medal is placed annually at the disposal of the council of the institute by the Mond Nickel Co. The presentation to Dr. Hume-Rothery will be made by the president at the annual general meeting of the institute on March 30.

The suspension of entrance fee for two years with effect from January 1, 1949, has been agreed by the council. The matter will be reviewed again at the end of that period.

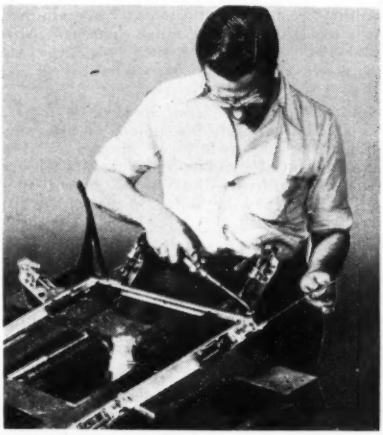
The 1949 autumn meeting of the institute is to be held in Paris in September.

A quick means of reference to the papers published by the institute has just been issued in Miscellaneous Publication No. 4 covering issues of the *Journal* between 1909 and 1948.

Aluminium Welding

New Low-Temperature Alloy

A NEW low-temperature aluminium welding alloy, Eutecrod 900X, that will not warp or distort aluminium surfaces, has recently been developed by the Eutectic



Welding Alloys Corporation, New York. The alloy, the company states, will permit the joining of thin aluminium at temperatures below the metal's melting point with greater fluidity than is attained by aluminium brazing.

The low temperature operation is said to make it particularly suited for the manufacture of all light-gauge aluminium parts, tubing, sheet, bands, shapes, without risk of distortion.

The new alloy is available in 3/64 in. and 1/32 in. in coil form. It bonds at 900°F. and remelts at 950°F. It has a tensile strength of 20,000 p.s.i. Corrosion resistance is stated to be comparable with aluminium and colour match is excellent.

Electroplating Chemicals

The British Standards Institution announces the formulation of a new British Standard for tin salts for electroplating: BS1468. The standard covers stannous sulphate and sodium stannate.

It lays down the minimum requirements for the content of tin expressed as stannous sulphate and sodium stannate respectively, and stipulates permissible impurity.

SUMMARIES OF NEW PROCESSES

PRODUCTION OF MOULDED CATALYSTS

Conversion of Active Metals to Hydrosilicates

FURTHER developments in the preparation of moulded catalysts of exceptional stability, resistance and activity are claimed in two additional English patents Nos. 18201/1948 and 18294/1948 of N.V. de Bataafsche Petroleum Maatschappij.

Catalysts may be distinguished as acidic, sulphitic, and those containing free metal. Claims have already been made in previous applications for catalysts containing free metal produced by converting metals wholly or partly into hydrosilicates and then reducing. This may be done in various ways already described.

The method is not limited to use of any one carrier material, but may be used with the most divergent carriers, such as alumina, silicon carbide, magnesium silicate, -oxide, or -carbonate, barium sulphate, etc., and satisfactory heat conductors in powdery or gritty condition.

It was found in use that carriers for moulded catalysts of great mechanical strength were not so active or could not be satisfactorily reduced.

Strength Preserved

It is now indicated, as the subject of the present invention, that moulded catalysts containing active metals and diluent, with great mechanical strength and catalytic activity, may be produced by converting active metal wholly or partly into hydrosilicate, mixing this in pulverised condition with a powdered diluent, compressing, and reducing.

With such diluents as alumina grits or other form of alumina it is desirable to use a lubricating agent such as graphite to facilitate removal from the press; but in other cases such lubricant may be unnecessary.

Catalytically active metals are the familiar ferrous group—iron, nickel, cobalt—as well as copper and manganese. They may be compressed in various forms (salts, etc.) and are applicable to a wide range of catalytic reactions, especially in the synthesis of hydrocarbons. They are eminently suitable for use in the liquid phase.

The method of preparation is described in detail, starting with the following initial solutions: (a) cobalt, thorium, and magnesium as nitrates; (b) anhydrous sodium carbonate in water; and (c) sodium silicate. The resulting suspension is vigorously stirred, mixed with alumina which had been previously heated to 600°C. for two hours and cooled; rapidly filtered, washed, dried, powdered, pressed into pellets, and reduced in hydrogen at 430°C. for one hour.

The catalyst finally consisted of 100 parts cobalt, by weight, 659 parts activated alumina, 8 parts magnesia, 5 parts thorium oxide, and 28 parts silicon oxide. Other examples are given.

The English patent No. 18294/1948 (Conv. date July 10, 1948) is similar to the foregoing, but is limited principally to metals which are wholly or partly converted into hydrosilicates, with beta-alumina as carrier, and reduced.

Progress by Oil Companies

Further evidence of the active development of these techniques by the oil companies in this field was given by members of the research staff of the Standard Oil Development Co. at a recent symposium on fluidisation by the American Chemical Society.

In introducing their paper, G. L. Matheson and co-workers referred to the great growth of catalytic cracking capacity, from 40,000 barrels per day in 1942 to 1 million barrels six years later.

In describing actions accompanying the upward journey of gas through the fluidised bed the need was indicated for adequate information about density and viscosity of the dense phase if engineering considerations are to be met. Density naturally decreases with increasing gas velocity.

American Chemical Notebook

From Our New York Correspondent

STEPS to relieve the threatened shortage of cellophane have been taken by the Sylvania Division of the American Viscose Corporation which has just revealed plans to double its present production, bringing the total annual output up to 100 million lb. The expansion scheme, at Fredericksburg, Va., announced by Dr. Frank H. Reichel, president of the company, is expected to take two years to complete. E. I. Du Pont de Nemours & Co., Inc., recently charged by the U.S. Government with monopolising the industry, produces about 75 per cent of the cellophane which at present totals some 220 million lb. annually.

* * *

As a result of two years of investigations developing new preparations and techniques, improved radium beryllium neutron sources are announced by the United States Radium Corporation, New York, as being available to industry. There is said to be a marked improvement in the neutron to gamma emission ratio and in duplication of results. Sources can be provided in a powdered or compressed radium-beryllium mixture in sizes ranging from a few milligrams for college laboratory use to 1000 or more milligrams for specialised applications. Standard polonium - beryllium sources are also available, while special sources employing beta or gamma activated beryllium can be obtained by arrangement.

* * *

The sale of 19,800 tons of Madagascar graphite to the United States Government by French suppliers with approval of the government of France has been announced by the Economic Co-operation Administration. The sale, which calls for a maximum annual export to America of 3000 metric tons of graphite, was arranged under the clause covering scarce materials of the economic co-operation agreement between the U.S.A. and France.

* * *

Purchase of $3.97 million worth palm oil for the stock of strategic materials of the U.S.A. has been authorised by the ECA. Output has been limited because of war damage in the principal producing areas which the Japanese occupied. The purchase is based on the use of five per cent of the special local currency counterpart guilder fund, which consists of guilders equal to the amount of American dollars granted to Holland and Indonesia for recovery goods.

* * *

Increasing potential uses are expected to be found for β-resorcylic acid, a fine organic chemical now being produced in commercial quantities. The compound, described in a technical bulletin issued by the chemical division of Koppers Company, Inc., combines the chemical reactivity of both resorcinol and salicylic acid, undergoing reactions typical of phenolic compounds and of aromatic acids.

* * *

A new form of sodium pentachlorophenate, an industrial preservative and slime control agent, is now being offered by the Monsanto Chemical Co. The product, Santobrite, is being sold as relatively dustless and rapidly dissolving pellets. An advantage of this new form is said to be the seed-like kernels of the pellets which are free-flowing and go into solution faster under static conditions because they do not paste.

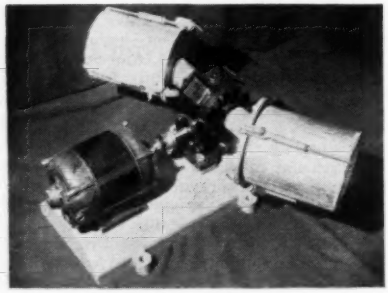
* * *

A new light amber liquid synthetic detergent for preventing dusting of powdered and dry detergent mixes, has recently been announced by the Monsanto Chemical Company, St. Louis, Mo. The product, to be sold under the trade mark Sterox CD, is stated to be 100 per cent active and non ionic. It is claimed that the addition of one to two per cent of the fluid to dry mixtures will reduce dusting during the mixing operation and in the finished product.

* * *

Two new products have been added recently to its list of organic chemicals by the American Cyanamid Company. These are the plasticisers di-2-ethyl hexyl phthalate and di iso octyl phthalate, now in production at the company's plant at Bridgeville, Pennsylvania. They are intended for compounding vinyl resins into films. Special properties are said to be that they remain liquid at temperatures as low as – 55° C., have a high tensile strength, flexibility and resistivity.

Technical News and Equipment



Collacott wobble mixer

THE wobble mixer, which was exhibited by R. A. Collacott & Partners, London, at the recent one-day London-Regional Display held by the Engineering Industries Association, at Seymour Hall, W., is claimed to be a very versatile machine, in that containers can be easily clamped to it and rotated in a way similar to that of a cocktail shaker. The ends of containers describe an out-of-phase rotation so that the contents are thrown axially and radially with a change of direction every half-revolution. There are said to be no "blind spots" and a thoroughly homogeneous mixture results.

As a rumbling machine the motion has been found to be very effective, especially for batches of small components, and in the chemical and related industries there appear to be many applications for which this machine is suited for the mixing of heavy liquids and pastes.

Machines can be made to accommodate either several containers or single containers up to 40-gall. capacity. The model shown is for two one-gall. containers.

An important feature is that the containers are loaded separately, so that there is no hold-up. It is possible to clear out the contents of containers without having to clear paddles or remote corners.

* * *

"What Makes an Efficient Oil Refinery?" is the generic title of the contents of No. 1 of the 1949 series of *The Kelloggram*, issued by the M. W. Kellogg Co., (a subsidiary of Fullman, Inc.), New York, U.S.A., makers of chemical engineering plant. The major differencies existing in world refining to-day are outlined and explained, and there are numerous illustrations of Kellogg-built plants in various parts of the world.

Spontaneous heating is frequently the cause of fire in stacks of coal and one of the means of reducing this risk is described in an article "Testing Temperature in Coal Dumps," in No. 4 of the *F.P.A. Journal* recently published by the Fire Protection Association. This article will later be incorporated into a revised technical booklet entitled "Prevention of Fires in Coal Stacks," which was first published in November, 1947.

* * *

Specially designed exhausting systems, adequate air filters and controlled intensities of electric light bulbs are among the precautions suggested to lessen the hazards of industrial dust explosions in a comprehensive study of the subject released by the Office of Technical Services, Department of Commerce, Washington 25, D.C. The "Handbook of Industrial Hazards from Explosive Dusts" is a two-volume study of the nature and composition of dust, its origin and its ignition. A general discussion in Volume I is supplemented, in the second volume, with a description of dust conditions in various industries, and analyses of several hundred instances of officially confirmed dust explosions. The text of the study is in German, with an abstract, foreword and table of contents in English. Diagrams and tables accompany the text.

* * *

The recently developed stationary mercury cell for the production of chlorine and caustic soda is described in a booklet recently published by the Mathieson Chemical Corporation, New York. Information is also given on properties and applications of the company's principal products.

* * *

One of two new products announced by Evans Medical Supplies, Ltd., in newly issued brochures, Heparin is a naturally occurring complex organic substance possessing the property of retarding the *in vivo* and *in vitro* coagulation of blood. It is administered intravenously and has wide applications. Hepovite, the other new product, is a dry granular product prepared from enzyme digested whole liver with malt and added vitamins. It is issued as a food supplement to increase protein and vitamin intake. A novel feature of this brochure is the inclusion of a sample of Hepovite in a pliofilm envelope.

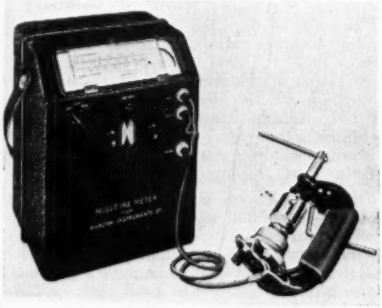
A work of value to anyone interested in the world oil industry is the "Oil and Petroleum Yearbook, 1948," published by Walter E. Skinner, London, E.C. Now in its 39th year, the directory gives particulars of all the major companies in the industry and incorporates a buyers' guide.

* * *

Just issued by Petromor, Ltd., Manchester 1, a member of the M.O.R. group of companies, is an informative eight-page booklet entitled "Sulphonates from Petroleum" dealing with surface-active agents. Technical descriptions are given of the family of water-soluble and oil-soluble suphonates made at the M.O.R. refineries. All are stated to be neutral in reaction, very stable and unaffected by temperatures up to 100° C. Copies of this booklet are freely available from the public relations department of the M.O.R. group of companies, 10 Dover Street, London, W.1.

* * *

The accuracy of the new Marconi Moisture Meter (T.F.923) has now been officially confirmed by the report issued by the National Institute of Agricultural Engineering. This is the first instrument of its kind to be submitted for test. Tests were carried out on various kinds of grain as harvested in all weather conditions and often storm-damaged. In the words of the report, results showed that "the meter is a practical piece of apparatus for agricultural use with wheat and barley . . . . and support the manufacturer's claim of an accuracy of ±1 per cent, in the range 10-20 per cent moisture content." In design the meter employs a d.c. resistance-bridge circuit with electronic null-detector which makes the reading independent of valve characteristics and supply voltages.



Marconi Moisture Meter

GERMAN TECHNICAL INFORMATION

AMONG the latest reports of German war-time industry, available from H.M. Stationery Office, is "The Photographic Industry in Germany during the period 1939-1945" (BIOS Overall Report No. 19—6d.). This is a critical review of the BIOS, CIOS, FIAT and Joint Intelligence Objectives Agency reports.

Other reports include:—

BIOS 1534. Further investigation of methods of gaseous metal treatment (3s. 6d.).

BIOS 1633. I. G. Farbenindustrie, Leverkusen bei Koln. Manufacture sulphuric acid (3s.).

BIOS 1800. Industria Gas Installations (15s.).

BIOS 1811. Synthesis of acrylates by reaction of acetylene carbon monoxide and alcohols (9s.).

BIOS 1815. Low temperature gas separation (17s. 6d.).

BIOS 1824. Jointless flooring in Germany (12s.).

BIOS 1825. German practice and operation of producer gas-driven vehicles and vehicles operating on compressed gas (5s. 6d.).

BIOS 1828. Handling and waste products of combustion in German brown-coal fired electric power stations (2s.).

BIOS 1832. German tyre and belting plants (2s.).

BIOS 1825. Investigation of power loading developments in Germany (7s.).

BIOS 1838. German high pressure hydrogen oxygen electrolyses development (3s.).

BIOS 1841. The manufacture of synthetic phenol at Dr. F. Raschig G.m.b.H., Ludwigschafen (1s. 6d.).

BIOS 1844. Some aspects of German soldering, brazing and welding methods (7s.).

BIOS 1848. Butt welding methods employed in pipe erection and fabrication in Germany (1s. 6d.).

BIOS MISC. 99. German electrical equipment industry (3s. 6d.).

BIOS/MISC. 113. Dutch report on additional information on various catalytic processes in Western Germany—II (9s.).

FIAT 647.—Viscose making machinery in Germany (32s. 6d.).

FIAT 1313. German dyestuffs and dyestuff intermediates, including manufacturing processes. Plant design and research data.

VOL. I. Dyestuff intermediate processes and analytical procedures (£2 5s.).

VOL. II. Dyestuff processes and engineering data (£1 15s.).

VOL. III. Dyestuff research (£2 10s.).

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Personal

MR. C. S. WINDEBANK, manager of the Esso Development Company's research department at Esso House, Abingdon, Berkshire, since 1947, this week became managing director of the Esso Development Company, which conducts and co-ordinates research, contract and patent work for the benefit of the Esso group of companies in Europe. He succeeds Mr. Hugh C. Tett, whose appointment to the post of general sales manager of the Anglo-American Oil Company is announced. On leaving London University in 1932, Mr. Windebank joined Chance Brothers, the glass manufacturers, of Smethwick, Staffs., as a research chemist. Four years later he went to the U.S.A. and in 1937 he joined the technical staff of International Association (Petroleum Industry), Ltd., in London. His association with the Esso group dates from 1940.

The acceptance of widened duties by PROF. SOLLY ZUCKERMAN, designed to render somewhat lighter the responsibilities of SIR HENRY TIZARD, chairman of the Advisory Council on Scientific Policy and the Committee on Industrial Productivity, has been announced by the Lord President of the Council. Prof. Zuckerman will serve as deputy chairman of both organisations. He will continue to serve as chairman of the panel on imports and as professor of anatomy at Birmingham University.

PROF. W. T. ASTBURY, Professor of Biomolecular structure at the University of Leeds, will go to Belgium on March 7 to lecture to Brussels University. His visit has been arranged by the British Council and is part of the interchange scheme for university lecturers under the Anglo-Belgian Cultural Convention. He returns on March 11.

MR. H. L. SATCHELL, manager of the B.T.H. Rugby Works, and its associated factories at Peterborough, Leicester, and Nelson (Lancs.) has been appointed a director of The British Thomson-Houston Co., Ltd. He was a founder member of the British Works Management Association, now absorbed in the Institution of Works Managers.

DR. MARJORY STEPHENSON, of Cambridge, an authority on chemical microbiology, in her £29,056 will, left £1000 to the Women Graduates' Club, Cambridge, and, after a number of other large legacies and bequests, the remainder to Newnham College, Cambridge.

The election of five new fellows and three new associates is announced by the Textile Institute, as follows: Fellows: MR. G. S. J. WHITE, chief colourist in the Dyestuffs Division of I.C.I., Ltd.; MR. COLIN H. BAYLEY (Ottawa, Canada), senior research officer since 1947 at the National Research Council in Ottawa; MR. H. CORTEEN; MR. ANDRE VARGA; and MR. J. GOLDBERG (New York). Associates: MR. H. GARNER (Canada); MR. R. WYLIE; and MR. W. H. GREEN.

PROF. F. S. SPRING, of the Royal Technical College, Glasgow, has been awarded the University of Liverpool Chemical Society Medal for this year. The presentation is to be made at the annual open meeting of the society, at which Prof. Spring will give an address on "The Chemistry of Aspergillic Acid."

MR. J. D. CAMPBELL has been appointed joint managing director, with the chairman, MR. DUNCAN CAMPBELL, of the London Aluminium Company. MR. JOHN FREDERICK MILLERSHIP has been appointed works director in the place of Mr. Campbell.

As a result of new appointments of the University of Birmingham, DR. F. MORGAN becomes reader in chemical engineering and DR. G. M. BURNETT and DR. W. G. OVEREND lecturers in chemistry.

MR. FREDERICK CHARLES DEVON, founder of the firm of F. C. Devon and Co., Ltd., chemical merchants, Philpot Lane, London, E.C., left £281,557 gross.

Obituary

MR. L. V. KENWARD, formerly chief of Dunlop's Rubber Products group, died suddenly at Haywards Heath on February 23 at the age of 62. He was chairman of the India Rubber Manufacturers' Association from 1929 to 1933, vice-president of the Institution of the Rubber Industry and vice-chairman of the Research Association of British Rubber Manufacturers and of the Midland Employers' Mutual Assurance. He played a leading part in the establishment of the Fort Dunlop joint factory council.

The death occurred recently of DR. MORITZ NIESSNER, aged 51, after an appendicitis operation. He was Professor of Inorganic Chemical Technology at the Technical High School, Vienna, and was known internationally for his numerous publications and patents chiefly dealing with metallurgical subjects.

INTEGRATING RESEARCH & INDUSTRY

Enterprising Programme in Manchester and the N.-W.

FURTHER evidence has been available this week of the very progressive policy of integrating the resources of scientific research with industry in Manchester and the North-West.

The conspicuous example is the Manchester Joint Research Council (Manchester Chamber of Commerce) whose report, presented on Monday, shows the success achieved by its four-year-old endeavours.

In a brief introductory note the chairman, Sir Raymond Streat, expresses his conviction that the joint consideration by academic men and industrialists of the problems of to-day, viewed in the light of the actual facts in an area like that which surrounds Manchester, is singularly well calculated to produce extremely useful results.

The constitution of the council was given careful consideration. Sir Raymond Streat and Sir Charles Renold were unanimously appointed chairman and treasurer, respectively, and it was decided to provide a continuity of responsibility that Mr. A. H. S. Hinchliffe and Sir John Stopford (who were not immediately eligible for re-election) should be appointed the first vice-chairmen.

One of the most successful meetings had been that held in February last year addressed by Dr. A. King, of the Office of the Lord President of the Council, who laid stress on two points likely to engage the council's activities for years to come, namely, the improvement of the technology of the small firm and the encouragement of accelerated development and inventiveness in industry generally.

Actual Needs

It was as part of the attempt to solve this problem that Sir Henry Tizard was invited to the October meeting of the council. Sir Henry's remarks strengthened the opinion, already beginning to take form, that a most substantial contribution might be made by the council if it sought to undertake an objective and scientific investigation of the needs of industry in this area. Thus a substantial part of the year's work had been devoted to laying down the main lines of a completely novel development.

Prof. W. M. Cumming, of Glasgow, also visited the council and gave an interesting account of the relations between the scientists and industrialists in his area.

The liaison and information service of the council had assisted investigations into asbestos dust from brake and clutch linings; a new type of humidometer; the heat pump; paper from straw; brake squeak; adhesives; the repair of broken shuttles and reports on German science and industry.

Special problems included the establishment of a committee of the principals of the technical colleges, set up to consider whether such colleges in the north-west area could undertake a certain amount of sponsored development work for industry.

Subsequently, members of the council were invited to devise a scheme whereby undergraduates could be given an opportunity to study some specific problem in industry as part of their training. It was visualised that the student should undertake about ten days' work to obtain an insight into some of the types of problems which he is likely to encounter after graduation and the conditions under which he would have to tackle them.

University and Industry

A further example of the co-operation of academic and industrial interests in the North-West is evidenced in a course of six lectures on "Operational Research in Industry," arranged by the Liverpool University Department of Extra Mural Studies in collaboration with the Dunlop Rubber Co., Ltd., and Distillers (Penicillin), Ltd. Representatives of Merseyside industrial firms will attend the lectures, which will be given weekly.

Among the lecturers will be Prof. P. M. S. Blackett (professor of physics, Manchester University); Prof. L. Rosenhead (professor of applied mathematics, Liverpool University); and Mr. Dennis Chapman (senior lecturer in social science, Liverpool University).

AIDING TECHNICAL TRAINING

THE inaugural meeting of the North-East Regional Advisory Council for Technical Education was held recently in Aberdeen.

Emphasising the necessity for co-ordinating theory and practice in planning future technical education, Mr. John Macdonald, assistant secretary to the Scottish Education Department, urged that if a basic minimum of technical training is necessary for all apprentices, it must be assured by apprentices being allowed time off to attend technical colleges during the day—possibly one day a week. If this were not possible for people living in remote areas, then the alternative was block release—release for continuous periods. Evening classes were, of course, still indispensable.

Home News Items

Gas Turbine Technology.—The fourth international students' course at the Power Jets' School of Gas Turbine Technology, Lutterworth, was inaugurated last week by a luncheon in London at the headquarters of Power Jets (Research Development).

SIMA Dinner-Dance.—The annual dinner dance of the Scientific Instrument Manufacturers' Association of Great Britain will be held at the Mayfair Hotel on Friday, May 6, 1949. As the date falls during the run of the BIF it is expected that many overseas visitors will be present.

French Tour.—Provisional arrangements have been made for the summer tour of the Food Group of the Society of Chemical Industry—in France, with Bordeaux as the centre. The party will leave London on Friday, June 10, returning on Sunday, June 19.

Brotherton Shares to be Offered.—Implementing the decision to divide the undertaking of Brotherton & Company into an operating company and a private investment company with £1,475,000 capital, an offer for sale of 600,000 ordinary 10s. shares in the former company at £1 each is about to be made. The operating company will have £1,275,000 capital.

First Pliofilm Factory.—Lord Ammon last week opened the new pliofilm factory of the Goodyear Tyre and Rubber Company (Great Britain) at Wolverhampton. Pliofilm, which was used during the war, is a transparent rubber hydrochloride film produced by casting from a solvent solution. It will first be used for the export industries and protection of food in this country and later will be available for domestic uses.

Wool Grease Recovery.—Under the auspices of the Manchester section of the Oil and Colour Chemists' Association, a visit has been arranged for Friday, March 11, to the wool grease recovery plant of the City of Bradford by-products department, at Esholt. Arrangements for those participating are in the hands of Mr. D. M. Wilson, honorary secretary of the section, c/o D. Anderson & Son, Ltd., Stretford, Manchester.

Steel Industry Film.—A film in technicolour which reveals that the campaign for greater production has its aspects of beauty has just been seen privately in London. Entitled "Steel," it was sponsored by the British Council in collaboration with the British Iron and Steel Federation. It is to be shown throughout the British Isles by the Aims of Industry Council as part of the campaign against nationalisation of steel.

Change of Address.—Charles Lennig & Co. (Great Britain), Ltd., chemical manufacturers' merchants, has changed its office address to 18-20 York Buildings, Adelphi, London, W.C.2 (telephone: Temple Bar 3979).

Trading with Greece.—A further volume in the series of Overseas Economic Surveys, a review of commercial conditions in Greece, was published for the Commercial Relations and Exports Department of the Board of Trade by H.M. Stationery Office on Thursday, March 3, 1949, price 1s.

Publication of Scientific Papers.—A conference between the Royal Society and scientific publishers to discuss the current position with regard to scientific publishing and printing is to be held shortly. The Royal Society states that it will be glad to receive any statement of difficulties and suggestions for discussion.

Weekly Coal Production.—Last week's total coal output in Britain was the highest this year. Comparative figures are: Last week, 4,333,900 tons (deep-mined 4,101,800 tons, opencast 232,100 tons). Previous week: 4,295,400 tons (deep-mined 4,080,900 tons, opencast 214,500 tons). Week ended February 28, 1948: 4,096,500 tons (deep-mined 3,890,500 tons, opencast 206,000 tons).

Better Soap Supplies.—"Recent improvement in soap supplies" is quoted by the Ministry of Food as the circumstance which has permitted the relaxation of the restrictions on the retailing of soap. Facilities for selling soap, where not already possessed, will be granted by Food Offices to: chemists (and druggists selling a wide range of pharmaceutical products); retailers with registrations for sugar, fats, bacon or cheese; hardware stores (or similar businesses) already selling other household cleaning materials.

Welfare and Efficiency Group.—A factory forum consisting of representatives of management and workers (28 each) met at Port Sunlight last week to discuss an agenda covering aspects of industrial efficiency and welfare, which are now being dealt with by a new system of joint consultation at Lever Brothers. The forum and 19 joint area committees are to permit joint consultation on questions relating to general efficiency, welfare, recreation, catering, accident prevention, health, hours and conditions of work, excluding questions covered by trade union agreements.

Next Week's Events

MONDAY, MARCH 7

Society of Chemical Industry. London: School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. Dr. T. Vickerstaff: "The Physical Chemistry of Dyeing." Leeds: University, 7.0 p.m. Joint meeting with Leeds University Chemical Engineering Society. J. S. Forsyth and H. C. Wilkinson: "A Method for Determining Naphthalene in Tar Oils"; S. M. Prasad: "The Properties of Producer Gas Tars."

Royal Institute of Chemistry. Woolwich: Polytechnic, S.E.18, 6.45 p.m. Joint meeting with Woolwich Polytechnic Scientific Society. G. E. Turfitt: "Science in Criminal Investigations."

TUESDAY, MARCH 8

Institution of Chemical Engineers. London: Burlington House, W.1, 5.30 p.m. J. Leyland: "Application of Vacuum to Industrial Chemical Processes"; G. Arrowsmith: "Production of Vacuum for Industrial Chemical Processes."

Royal Institute of Chemistry. Welwyn Garden City: The Cherry Tree, 8.0 p.m. Joint meeting with Welwyn Garden City Scientists' Club. A. Aibert: "Drug-Action, Ions and Neutral Molecules."

Chemical Society of Leicester University College. Leicester: University College, 6.0 p.m. Prof. E. G. Cox: "Some Recent Work in Crystal Chemistry."

WEDNESDAY, MARCH 9

Society of Chemical Industry (Food Group). London: Microbiological Panel Annual General Meeting. Dr. E. Windle-Taylor: "Microbiological Problems in the Production of Pure Water."

Society of Dyers and Colourists. Nottingham: Victoria Station Hotel, 7.0 p.m. A. Mellor and H. C. Olpin: "Dyeing and Finishing Fabrics containing Acetate Staple."

Oil and Colour Chemists' Association. London: Dorchester Hotel, Park Lane, W.1. First post-war dinner. Sir Edward Appleton will present insignia of office to the president, Dr. L. A. Jordan.

THURSDAY, MARCH 10

Society of Chemical Industry (Nottingham Section and Fine Chemicals Group). Nottingham: Visit to the factory, Beeston, horticultural research station, Lenton, and pharmacological laboratory, West Bridgford, of Boots Pure Drug Co., Ltd. Evening: Informal dinner at Black Boy Hotel.

The Chemical Society. Manchester: University, 6.30 p.m. Reading of original papers. North Wales: Aberystwyth, Edward Davies Chemical Laboratories, 5.0 p.m. Joint meeting with University College of Wales Chemical Society. Dr. E. A. Moelwyn-Hughes: "The Liquid State." Nottingham: University, 6.30 p.m. Prof. A. Robertson: "Some Metabolic Products of Moulds."

Institution of Works Managers. Wembley: Rest Hotel, Kenton, 12.30 p.m. F. W. Doxey: "Industrial Safety."

Institute of Metals. London: 4 Grosvenor Gardens, S.W.1, 7.0 p.m. Col. W. C. Devereux: "Structural Uses of Light Metals."

The Royal Society. London: Burlington House, W.1, 4.30 p.m. Sir Charles Harington: "Work of the National Institute for Medical Research."

British Association of Chemists. London: Gas Industries House, 1 Grosvenor Place, S.W.1. Dr. J. Needham: "The Work of UNESCO."

Institute of Welding. London: 11 Upper Belgrave Street, S.W.1, 6.0 p.m. Joint meeting with Institution of Structural Engineers. J. T. Phillips and F. J. Daniels: "Welded Steel Framed Buildings."

FRIDAY, MARCH 11

Society of Chemical Industry (Nottingham Section and Fine Chemicals Group). Nottingham: Visit to Laboratories and Works of British Chemicals and Biologicals, Ltd.

The Chemical Society. Glasgow: University, 7.15 p.m. Prof. G. R. Clemo: Lecture. South Wales: University College, Swansea, 6.0 p.m. Joint meeting with the University of Swansea Students' Chemical Society. Dr. G. M. Bennett: "The Function of Sulphuric Acid in Aromatic Nitration."

Oil and Colour Chemists' Association. Manchester: Visit to Bradford Corporation Wool Grease Recovery Plant, Esholt. S. G. Campbell: "Wool Grease Derivatives in Paint."

Society of Public Analysts. London: Imperial College of Science and Technology, South Kensington, S.W.7, 5.0 p.m. P. Welford: "Buffer Solutions and the Concept of Polarographic Capacity"; J. A. Lewis: "Paper Strip Extraction and Polarography"; J. G. Waller: "The Polarographic Behaviour of Aromatic Nitro-Compounds." Open discussion.

SATURDAY, MARCH 12

Institution of Chemical Engineers. Manchester: College of Technology, 3.0 p.m. J. C. Wood-Mallock: "Solvent Extraction as a Unit Process."

EDUCATION AND OPINION

Royal Society Lectures

TWO lectures of interest are announced by the Royal Society. The Bakerian lecture, first delivered in 1775, was founded by Mr. Henry Baker for " a yearly oration or discourse by one of the Fellows on some part of natural history or experimental philosophy." This year's lecture will be given at the Royal Society on May 12 by Prof. H. Raistrick, Professor of Biochemistry at London University.

The Wilkins lecture on the history of science was founded as recently as 1947 by J. D. Griffith Davies, a recent assistant secretary of the society, who delivered the first lecture. Prof. E. N. da C. Andrade, Quain Professor of Physics at London University, will deliver the lecture this year on December 15.

ANTI-SMOKE MEASURES

SMOKE was described as a great social evil at a conference at Wrexham, recently, attended by representatives of Wrexham Rural Council, Wrexham Town Council and Llangollen Council. Mr. Sydney N. Duguid, consulting engineer of Lymm, near Warrington, illustrating the fallaciousness of the idea that pollution was localised, said it had been proved that the fleece of sheep in the Isle of Man contained soot particles blown from Lancashire by east winds. Mr. Duguid advocated the use of smokeless fuels, modern grates, the need for proper training in the skilled work of caring for fuel plants, and counter propaganda to the idea that coal fires were the best domestic heating, and the more widespread use of central, electrical and other modern methods.

The Buyers' Rôle

Proposing the principal toast at the dinner in London last week of the Purchasing Officers' Association, Mr. H. C. Mills (managing director, The Morgan Crucible Co., Ltd.), said that purchasing had now become one of the most important functions of business management. He complimented the association on the work it was doing to increase the knowledge and efficiency of its members, on its education scheme which had been drawn up to cater for the younger generation.

Replying to the toast of "The Guests," Captain R. C. Todhunter, R.N. (purchases controller, I.C.I., Ltd.), said he considered the difference between good and bad purchasing was probably comparable to a 5 per cent dividend.

SCI Nottingham Meeting

A SPECIAL two-day joint meeting of the Nottingham Section and Fine Chemicals Group of the SCI is to be held at Nottingham and Loughborough on March 10-11.

The first-day visitors will be the guests of Boots Pure Drug Co., Ltd., at luncheon and afterwards have the choice of visiting the company's factory at Beeston, or the horticultural research station, Lenton, or the pharmacological laboratory, Bridgford. In the evening, Mr. J. C. McGowan and Mr. J. F. Grove will give a lecture in the demonstration theatre of the Gas Company's showrooms, Nottingham, on " Some Applications of Physical Chemistry to the Study of Certain Biologically Active Compounds." This will be followed by an informal dinner.

The visit on the second day will be, in the morning, to the laboratories and works of British Chemicals and Biologicals, Ltd., Loughborough, to be followed by a luncheon as guests of that company.

POST-GRADUATE LECTURES

TWO new series of lectures of value to chemists in industry are announced by the Technical College, High Street, Acton, W.3.

"Recent Advances in Electro-Chemistry" is the title of four lectures by J. O.'M. Bockris to be given on Fridays, March 4, 11, 18 and 25, at 7.30 p.m. Subject matter will include recent work on: Inter ionic forces; solvation; overpotential; electrochemistry of non-aqueous solutions with special reference to electrodeposition.

" Some Modern Aspects of Biochemistry " form the subject of ten lectures to be given on Fridays at 7.30 p.m. beginning on April 29. The course is divided in three groups. The first four lectures will be by D. Herbert on " Biological Oxidations and Oxidation Enzymes "; the next three by F. L. Warren covering " Biological Degradation of the Steroid Molecule," and the final three by the same speaker on " Application of Polarography in Biochemistry."

OCCA First Post-War Dinner

The first dinner since the war of the Oil and Colour Chemists' Association, as a whole, is to be held at the Dorchester Hotel, Park Lane, next Wednesday (March 9). Sir Edward Appleton, vice-chancellor elect of Edinburgh University, will invest the president, Dr. L. A. Jordan, with the insignia of office. The insignia was a gift from the Reichhold-Beck Koller group to further Anglo-American amity.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsibe for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ASSOCIATED RESIN PRODUCTS, LTD., London, S.W. (M., 5/3/49.) January 18, £25,000 charge and mortgage, to Yorkshire Insurance Co., Ltd.; charged on land at Church Road, Paddock Wood, with factory and buildings thereon (priority to the charge created by a debenture dated April 5, 1948). *£25,000. June 28, 1948.

SCIENTIFIC SUPPLIES CO., LTD., London. E.C. (M., 5/3/49.) January 20, £5000 (not ex.) charge, to Magnet Building Society; charged on 13, 15, 17 and 19 Vine Hill, Holborn, E.C. *Nil. February 26, 1947.

Satisfactions

BRISTOL'S INSTRUMENT CO., LTD., London, N.W. (M.S., 5/3/49.) Satisfaction January 19, of charge registered July 29, 1936.

MELWOOD THERMOPLASTICS, LTD, London, E.C. (M.S., 5/3/49.) Satisfaction January 19, of debenture registered January 21, 1948.

New Companies Registered

Aldwych Chemicals, Ltd. (464,689). Private company. Capital £5000. Manufacturers and refiners of oils, chemicals, spirits, paints, shellac, etc. Directors: L. A. Lever, Miss E. Lever. Reg. office: Danes Inn House, 265 Strand, W.C.2.

Cargose, Ltd. (464,728). Private company. Capital £1000. Manufacturing and research chemists, etc. Directors: J. T. Beddall, 6 Edward Street, Dudley; and W. Beddall.

Chemical and Engineering Co., Ltd. (12,783). Private company. Capital £2000. Objects: To buy and sell, import or export raw materials, manufactured goods, engineering and chemical products, etc. Subscribers: G. Bernfell, 95 Lower Beechwood Avenue, Ranelagh, Dublin, N. V. Nowlan and J. Toner.

Durazone (Northern), Ltd. (464,529). Private company. Capital £1000. Chemical manufacturers. Director: H. Presman. Reg. office: 12 Devonshire Row, Bishopsgate, E.C.2.

Guaranteed Sanitation, Ltd. (464,919). Private company. Capital £100. Manufacturing chemists, pest control operators, etc. Director: W. David. Reg. office: 263 Upper Street, N.1.

I. G. Lewis & Co., Ltd. (464,658). Private company. Capital £500. Turf producers, dealers in fertilisers, fungicides, insecticides, etc. Directors: I. G. Lewis, Irene Lewis, J. W. Martin. Reg. office: 2 Southampton Place, W.C.1.

Northern Chemical Industries (Dudley), Ltd. (464,876). Private company. Capital £20,000. Manufacturing, research and development chemists, etc. Directors: J. T. Beddall, 6 Edward Street, Dudley; and W. Beddall.

Tytherington Products, Ltd. (462,304). Private company. Capital £1000. Manufacturers of chemicals, etc. Directors: F. S. Webster, T. H. N. Spencer. Reg. office: 353 Chester Road, Cornbrook, Manchester.

Chemical and Allied Stocks and Shares

STOCK markets have been depressed and prices in most sections have again fallen away in the absence of demand. Sentiment has been affected by political developments, and fears that the budget will bring little in the way of taxation reliefs. Share prices in some sections were marked down because there has been renewed talk that the chemical industry is among those included for nationalisation in the Labour Party's draft "second five-year plan." The City is expecting the budget to bring Purchase Tax reductions, and perhaps modifications of the Bonus Tax, but little more.

Imperial Chemical at 46s. 6d. lost only a little ground, buyers coming in on any reaction, on confidence that the 10 per cent dividend will be maintained, despite the fact the final payment will be payable on the larger capital. Monsanto 5s. shares, which in recent weeks have been a very firm feature, have now fallen heavily to 55s. Fisons, however, were again well maintained, business being slightly over 60s. Laporte Chemical 5s. shares eased to 20s. 6d., Albright & Wilson were 31s. and Amber Chemical 2s. shares 9s. 3d. Burt Boulton attracted buyers, dealings up to

29s. 3d. being recorded. Elsewhere, Greeff-Chemical Holdings 5s. shares were dealt in around 13s. 3d.

Shares of plastics companies receded with chemicals, British Xylonite falling 5s. to 108s. 9d., while De La Rue were 38s. and J. B. Broadley 11s. 3d. Elsewhere, British Industrial Plastics 2s. shares were 6s. 6d. Kleemann were down to 21s.

British Glues & Chemicals 4s. shares have been steady at 21s. and in anticipation of good financial results, Blythe Chemical 3s. shares held their rise, dealings up to 21s. being recorded. United Molasses receded to 46s. 9d. with the general trend, and the 4s. units of the Distillers Co. were 28s. British Plaster Board eased to 22s. 10½d., and there was a general fall in paint shares on reports of increasing competition and talk of price cutting. The reduced profits put Sherwoods Paints down to 18s. 9d. Elsewhere, Lewis Berger 4s. units fell to 30s., Goodlass Wall to 36s. 6d., International Paint to 30s. and Pinchin Johnson to 47s. 6d.

British Aluminium at 50s. 9d. have been relatively steady, in anticipation of good financial results, but Blythe Colour were still affected by the reduced profits and fell back further to 51s. 3d. At the time of writing, Turner & Newall (83s. 9d.) have been a relatively firm feature. Amalgamated Metal kept at 20s. 3d. on market expectations that the dividend will be maintained.

Iron and steel shares kept very steady, Dorman Long at 32s. 9d., United Steel 30s. 4½d. and Stewarts & Lloyds 57s. 1½d., but Tube Investments eased to £6¼. Staveley fell to 83s. 9d. on the difficulty of estimating the value of the shares until it is possible to assess the value of the non-steel assets reprieved from nationalisation.

Glaxo Laboratories have changed hands around £21¾, and in other directions, Ilford at 29s. 10½d. have been fairly steady, sentiment still being helped by the good impression created by the financial results.

British Chemical Prices

Market Reports

SETTLED trading conditions are again reported from almost all sections of the market and firm values are displayed throughout. Inquiries for new business have been fairly brisk both on home and export account, and the movement to home consumers against contract commitments has been fully up to schedule. A good demand persists for the soda products and this demand is particularly strong in the case of soda ash and caustic soda. The potash compounds are unaltered at firm rates and in other directions of the market a moderate turnover is reported. The coal-tar products market is without feature and is unchanged.

MANCHESTER.—There is a steady demand from Lancashire users of textile chemicals on the Manchester market and good quantities of a wide range or heavy chemicals are finding their way into other using industries, with a fair inquiry reported from the rubber and paper branches. A fair volume of new inquiry on home trade account is still outstanding. Shippers have been in the market with offers of export business in caustic soda and other bread-and-butter lines. The price position remains steady to firm in all sections. In fertilisers, a fair trade is passing in superphosphates and the compound materials. There is steady absorption of supplies of most of the leading light and heavy tar products.

GLASGOW.—The demand for coal-tar products in the Scottish chemical market during the past week has shown an increase. All other classes of materials have been well absorbed, and the volume of business transacted has been higher than recently, although still below the average for the time of year. The demand for horticultural chemicals continues on a good scale, and prices have remained steady. Scottish exports continue to show very satisfactory progress, being higher than ever before.

STAVELEY COMPANY'S HOLDINGS

THE new structure of the Staveley iron, coal and chemical group set up in consequence of the Government decision to exclude the Staveley Coal and Iron Company from the companies to be taken over has been described in an announcement by the company. All those interests likely to be placed under State control were transferred, before the Bill was introduced, to a subsidiary, the Staveley Iron and Chemical Company. The parent company's interests are now centred in the following:—

(1) Shareholders in wholly owned subsidiaries, *i.e.*, Staveley Iron and Chemical, British Soda Company, Bradley and Foster, Bradley's (Darlaston), Beswick's Lime Works, and Birmingham Chemical (of these only the first-named is to be acquired by the State). (2) Claims for compensation under the Coal Nationalisation Act. (3) Interests in the following collieries which are also to be compensated: Arkwright Coal (100 per cent owned), Doncaster Amalgamated (40 per cent), and Newstead (50 per cent). (4) Investments in Government, etc., securities. (5) Certain small items of land and other fixed assets.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted wil be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2 at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Electro deposition of nickel.—Mond Nickel Co., Ltd. Sept. 6, 1945. 615,036.

Hydrolysis of polyvinyl esters.—E. I. Du Pont de Nemours & Co. Aug. 24, 1945. 615,079.

Process and apparatus for the manufacture of tapered glass tubes.—I.C.I., Ltd., and H. J. Welbergen. Aug. 26, 1946. 615,097.

Micrometer gauges.—Moore & Wright (Sheffield), Ltd., and W. Jackson. Aug. 26, 1946. 615,102.

Process for the manufacture of basic steel of low phosphorus content.—Soc. Anon. des Forges et Acieres du Nord et de l'Est. May 10, 1938. 615,611.

Manufacture of superphosphates and compound fertilisers.—R. & J. Moritz Entreprise. March 17, 1939. 615,513.

Process for the preparation of unsaturated derivatives of 2-methyl-2-hydroxy-3-halogen-tetrahydrofurane and for their conversion to vitamin B_1 and the like.—R. T. Chinoin Gyogyszer es Vegyeszeti Termekek Gyara. (Dr. Keresety and Dr. Wolf.) May 27, 1940. 615,604.

Manufacture of textile fibres composed of casein or casein and cellulose.—A. Ferretti. March 6, 1941. 615,305.

Moulded products.—Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann, and G. Passelecq. Nov. 9, 1940. 615,405.

Hardening of high-speed steel.—A. de F. Holden. March 18, 1943. 615,515.

Selenium rectifiers.—A. M. Monath. Aug. 16, 1944. 615,616.

Viscosimeter.—K. Fischer. May 15 1944. 615,414.

Specific gravity indicator.—K. Fischer. May 15, 1944. 615,518.

Manufacture of malleable iron.—A. G. E. Robiette. Feb. 27, 1945. 615,307.

Methods of conditioning vegetable bast fibres for spinning.—Regents of the University of Minnesota. April 3, 1944. 615,519.

Polymeric materials.—E. I. Du Pont de Nemours & Co., and E. F. Izzard. May 4, 1945. 615,520.

Method of converting secondary amines to nitramines.—Honorary Advisory Council for Scientific & Industrial Research. Dec. 30, 1944. 615,310.

Gas-testing apparatus.—W. M. Zaikowsky. March 1, 1943. 615,623.

Nitramines and their preparation.—Honorary Advisory Council for Scientific & Industrial Research. July 19, 1944. 615,419.

Process for the alkylation of aromatic hydrocarbons.—Universal Oil Products Co. April 29, 1944. 615,624.

Method for the preparation of 1 : 3-diketones.—Carbide & Carbon Chemicals Corporation. May 26, 1944. 615,523.

Moulding compositions.—I.C.I., Ltd., and G. P. Lee. June 20, 1945. 615,209.

Manufacture of diazo-dystuffs containing copper in complex union.—Clayton Aniline Co., Ltd., J. A. Schedler, and R. Whalley. July 17, 1945. 615,210.

Method of contacting fluids one with another.—J. G. Fife. (Shell Development Co.) July 30, 1945. 615,425.

Preparation of beta-mercaptovaline and metal salts thereof.—American Cyanamid Co. July 17, 1944. (Sample furnished). 615,628.

Process for quickly manufacturing hollow metallic or non-metallic bodies, means for carrying out this process and hollow bodies resulting therefrom.—M.M.P.R. De La Fourniere. May 16, 1944. 615,211.

Coal tar.—A. Parker, and L. Levinovitsch. Sept. 4, 1945. 615,212.

Magnesium hydroxide bonding agents.—V. M. Goldschmidt. Sept. 13, 1945. 615,316.

Process for treating acid sludge.—Stauffer Chemical Co. April 3, 1945. 615,213.

Devices for weighing liquids.—M. K. Johannessen. May 12, 1941. 615,317.

Application of powders in agriculture.—G. Truffaut, and P. Hampe. Oct. 22, 1943. 615,322.

Preparation of solutions of calcium chlorate poor in chloride.—Solvay & Cie. Aug. 10, 1944. 615,438.

Process for reducing the viscosity of or for liquefying mucous, and preparations for use therein.—A. Kraus. Nov. 12, 1945. 615,323.

Production of chlorine-containing formals.—Imperial Chemical Industries, Ltd. Nov. 17, 1944. 615,634.

Apparatus for examining materials by magnetic means.—A. B. Du Mont Laboratories, Inc. Jan. 24, 1945. 615,636.

Production of metals and metal alloys.—Aktieselskabet Smeltemetoden. Jan. 13, 1945. 615,327.

Production of metanilamidodiazines and intermediates thereof.—American Cyanamid Co. Feb. 14, 1945. 615,328.

Process for the production of aldehydes and ketones.—Usines de Melle. Feb. 8, 1945. 615,543.

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SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

AN expanding Middle East Oil Company urgently requires an Assistant Engineer to work initially in the London Office and be willing to accept transfer to the Persian Gulf after one year. Should possess B.Sc. Degee in Chemical or Mechanical Engineering. Will be required to assist in duties involving loading and bunkering facilities, oil gas distribution, and other oil control duties. Some experience of these duties essential. Experience in oil bunkers control with docks operating group of the Royal Engineers may be advantageous. Age 25–30. Salary starting £600-£700 per annum according to age and experience. Write, giving brief details, for application form, and quoting LO 133, to Box "P.Y." c/o J. W. VICKERS & Co., LTD., 7/8, Great Winchester Street, London, E.C.2.

ASSISTANT Works Engineer required for construction and maintenance of chemical works, West Riding, Yorkshire. Applicant should be 25 to 35 years of age. Should have sound theoretical training and practical experience in Mechanical Engineering and chemical works plant. Applicant should state age, full details of training, experience and salary to Works Manager, Box No. 2772, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

LABORATORY TECHNICIAN, aged 25-30, required in Technical Sales Department of Scientific Apparatus Suppliers, London. Salary, £300/£350 p.a., 5-day week, superannuation scheme. Good prospects for keen man anxious to apply practical experience to salesmanship. Write, stating experience and qualifications, to Box No. 2775, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

LAPORTE CHEMICALS LIMITED have vancancies in their expanding research organisation for assistant chemists to work in their modern, well-equipped laboratory at Luton. Candidates over 22 years of age should have Inter-B.Sc. or equivalent Good prospects. Apply in writing to **Research Manager, Laporte Chemicals Limited, Luton, Bedfordshire.**

PROCESS Foreman or Superintendent with extensive and practical experience in the manufacture of bleaching powder required by up-to-date chemical manufacturers in India. Three year contract is offered with possibility of renewal. Write stating full details of previous experience, age and qualifications to Box No. 2778, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

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A well paid and responsible position is available for an experienced Light Alloy Spectroscopist, to take charge of this section in our Laboratories. Opportunity for research and development in production analysis as well as routine control. Male or female applicants. Write fully giving age, experience, availability, etc. **T. J. Priestman Ltd., Cupro Foundry, Birmingham, 12**

SCOTTISH Home Department invite applications for the following posts on their scientific staff :—

(1) Senior Scientific Officer or Scientific Officer as Chemist at their Marine Laboratory, Aberdeen.
(2) Senior Scientific Officer as Chemist at their Brown Trout Research Laboratory, Pitlochry.
(3) Scientific Officer as Botanist at their Brown Trout Research Laboratory, Pitlochry.

Candidates for the post of Senior Scientific Officer must be at least 26 on 1st August, 1949 and for Scientific Officer at least 21 on the same date ; and have obtained a university degree in a scientific subject with first or second class honours, or an equivalent qualification. For post (1) an interest in physical and or organic chemistry is required ; for post (2) a special interest in physical chemistry and ability to undertake fundamental research in chemistry of fresh waters is necessary ; and for post (3) candidates will require to undertake fundamental studies of the phyto-plankton of fresh waters. Previous research experience is preferable for posts (1) and (2).

The scales of salary for men at Aberdeen and Pitlochry are :—

Senior Scientific Officer : £670 to £860 ;
Scientific Officer : £380 to £620.
Scales for women are somewhat lower.
Further particulars and forms of application may be had from **The Establishment Officer, Scottish Home Department, Room 364, St. Andrew's House, Edinburgh, 1,** with whom completed applications should be lodged not later than, 31st March, 1949.

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